**3GPP TSG-RAN WG2 Meeting #123bis R2-230xxxx**

**Xiamen, China, October 9-14, 2023**

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| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** | **-** | **rev** | **-** | **Current version:** | **17.5.0** |  |
|  |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | Introduction of maximum aggregated bandwidth for FR1 inter-band CA and for FR2 intra-band CA |
|  |  |
| ***Source to WG:*** | Qualcomm Incorporated |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_BCS4-Core, NR\_RF\_FR2\_req\_enh2-Core |  | ***Date:*** | 2023-09-29 |
|  |  |  |  |  |
| ***Category:*** | **C** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | In R2-2302439 (R4-2303685), RAN4 requested RAN2 to consider new UE capability parameters indicating the maximum aggregated bandwidth for FR1 inter-band CA band combination, for the purpose of reducing the UE capability signalling overhead.In addition, for the similar purpose of reducing the UE capability signalling overhead, in R2-2302440, RAN4 has requested RAN2 to consider signalling new UE capability on the aggregated bandwidth for FR2 R2-R12 BW classes in contiguous CA for FBG5. In addition, RAN2 agreed xxxx |
|  |  |
| ***Summary of change:*** | xxxxx**Impact analysis**Impacted 5G architecture options:NR SA, (NG)EN-DC, NR-DC, NE-DCImpacted functionality:FR1 inter-band CAFR2 intra-band CAInter-operability:* If the network is implemented according to the CR and the UE is not; the UE would have to signal a large number of combinations of maximum supported CC bandwidths in feature set combination.
* If the UE is implemented according to the CR and the network is not; the network would incorrectly consider the UE supports the maximum bandwidth for each CC as signalled in FeatureSetUplinkPerCC and FeatureSetDownlinkPerCC without taking into acount the additional limit for aggregated bandwidth for the corresponding band combination.
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|  |  |
| ***Consequences if not approved:*** | The UE would have to signal a large number of combinations of maximum supported CC bandwidths in feature ser combination. |
|  |  |
| ***Clauses affected:*** | 6.3.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS38.306 CR0xxx |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

### 6.3.3 UE capability information elements

[…]

– *BandCombinationList*

The IE *BandCombinationList* contains a list of NR CA, NR non-CA and/or MR-DC band combinations (also including DL only or UL only band).

***BandCombinationList* information element**

-- ASN1START

-- TAG-BANDCOMBINATIONLIST-START

BandCombinationList ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination

BandCombinationList-v1540 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1540

BandCombinationList-v1550 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1550

BandCombinationList-v1560 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1560

BandCombinationList-v1570 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1570

BandCombinationList-v1580 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1580

BandCombinationList-v1590 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1590

BandCombinationList-v15g0 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v15g0

BandCombinationList-v1610 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1610

BandCombinationList-v1630 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1630

BandCombinationList-v1640 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1640

BandCombinationList-v1650 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1650

BandCombinationList-v1680 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1680

BandCombinationList-v1690 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1690

BandCombinationList-v16a0 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v16a0

BandCombinationList-v1700 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1700

BandCombinationList-v1720 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1720

BandCombinationList-v1730 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1730

BandCombinationList-v1740 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1740

BandCombinationList-v17x0 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v17x0

BandCombinationList-UplinkTxSwitch-r16 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-r16

BandCombinationList-UplinkTxSwitch-v1630 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1630

BandCombinationList-UplinkTxSwitch-v1640 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1640

BandCombinationList-UplinkTxSwitch-v1650 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1650

BandCombinationList-UplinkTxSwitch-v1670 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1670

BandCombinationList-UplinkTxSwitch-v1690 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1690

BandCombinationList-UplinkTxSwitch-v16a0 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v16a0

BandCombinationList-UplinkTxSwitch-v1700 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1700

BandCombinationList-UplinkTxSwitch-v1720 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1720

BandCombinationList-UplinkTxSwitch-v1730 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1730

BandCombinationList-UplinkTxSwitch-v1740 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1740

BandCombinationList-UplinkTxSwitch-v17x0 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v17x0

BandCombination ::= SEQUENCE {

 bandList SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters,

 featureSetCombination FeatureSetCombinationId,

 ca-ParametersEUTRA CA-ParametersEUTRA OPTIONAL,

 ca-ParametersNR CA-ParametersNR OPTIONAL,

 mrdc-Parameters MRDC-Parameters OPTIONAL,

 supportedBandwidthCombinationSet BIT STRING (SIZE (1..32)) OPTIONAL,

 powerClass-v1530 ENUMERATED {pc2} OPTIONAL

}

BandCombination-v1540::= SEQUENCE {

 bandList-v1540 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1540,

 ca-ParametersNR-v1540 CA-ParametersNR-v1540 OPTIONAL

}

BandCombination-v1550 ::= SEQUENCE {

 ca-ParametersNR-v1550 CA-ParametersNR-v1550

}

BandCombination-v1560::= SEQUENCE {

 ne-DC-BC ENUMERATED {supported} OPTIONAL,

 ca-ParametersNRDC CA-ParametersNRDC OPTIONAL,

 ca-ParametersEUTRA-v1560 CA-ParametersEUTRA-v1560 OPTIONAL,

 ca-ParametersNR-v1560 CA-ParametersNR-v1560 OPTIONAL

}

BandCombination-v1570 ::= SEQUENCE {

 ca-ParametersEUTRA-v1570 CA-ParametersEUTRA-v1570

}

BandCombination-v1580 ::= SEQUENCE {

 mrdc-Parameters-v1580 MRDC-Parameters-v1580

}

BandCombination-v1590::= SEQUENCE {

 supportedBandwidthCombinationSetIntraENDC BIT STRING (SIZE (1..32)) OPTIONAL,

 mrdc-Parameters-v1590 MRDC-Parameters-v1590

}

BandCombination-v15g0::= SEQUENCE {

 ca-ParametersNR-v15g0 CA-ParametersNR-v15g0 OPTIONAL,

 ca-ParametersNRDC-v15g0 CA-ParametersNRDC-v15g0 OPTIONAL,

 mrdc-Parameters-v15g0 MRDC-Parameters-v15g0 OPTIONAL

}

BandCombination-v1610 ::= SEQUENCE {

 bandList-v1610 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1610 OPTIONAL,

 ca-ParametersNR-v1610 CA-ParametersNR-v1610 OPTIONAL,

 ca-ParametersNRDC-v1610 CA-ParametersNRDC-v1610 OPTIONAL,

 powerClass-v1610 ENUMERATED {pc1dot5} OPTIONAL,

 powerClassNRPart-r16 ENUMERATED {pc1, pc2, pc3, pc5} OPTIONAL,

 featureSetCombinationDAPS-r16 FeatureSetCombinationId OPTIONAL,

 mrdc-Parameters-v1620 MRDC-Parameters-v1620 OPTIONAL

}

BandCombination-v1630 ::= SEQUENCE {

 ca-ParametersNR-v1630 CA-ParametersNR-v1630 OPTIONAL,

 ca-ParametersNRDC-v1630 CA-ParametersNRDC-v1630 OPTIONAL,

 mrdc-Parameters-v1630 MRDC-Parameters-v1630 OPTIONAL,

 supportedTxBandCombListPerBC-Sidelink-r16 BIT STRING (SIZE (1..maxBandComb)) OPTIONAL,

 supportedRxBandCombListPerBC-Sidelink-r16 BIT STRING (SIZE (1..maxBandComb)) OPTIONAL,

 scalingFactorTxSidelink-r16 SEQUENCE (SIZE (1..maxBandComb)) OF ScalingFactorSidelink-r16 OPTIONAL,

 scalingFactorRxSidelink-r16 SEQUENCE (SIZE (1..maxBandComb)) OF ScalingFactorSidelink-r16 OPTIONAL

}

BandCombination-v1640 ::= SEQUENCE {

 ca-ParametersNR-v1640 CA-ParametersNR-v1640 OPTIONAL,

 ca-ParametersNRDC-v1640 CA-ParametersNRDC-v1640 OPTIONAL

}

BandCombination-v1650 ::= SEQUENCE {

 ca-ParametersNRDC-v1650 CA-ParametersNRDC-v1650 OPTIONAL

}

BandCombination-v1680 ::= SEQUENCE {

 intrabandConcurrentOperationPowerClass-r16 SEQUENCE (SIZE (1..maxBandComb)) OF IntraBandPowerClass-r16 OPTIONAL

}

BandCombination-v1690 ::= SEQUENCE {

 ca-ParametersNR-v1690 CA-ParametersNR-v1690 OPTIONAL

}

BandCombination-v16a0 ::= SEQUENCE {

 ca-ParametersNR-v16a0 CA-ParametersNR-v16a0 OPTIONAL,

 ca-ParametersNRDC-v16a0 CA-ParametersNRDC-v16a0 OPTIONAL

}

BandCombination-v1700 ::= SEQUENCE {

 ca-ParametersNR-v1700 CA-ParametersNR-v1700 OPTIONAL,

 ca-ParametersNRDC-v1700 CA-ParametersNRDC-v1700 OPTIONAL,

 mrdc-Parameters-v1700 MRDC-Parameters-v1700 OPTIONAL,

 bandList-v1710 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1710 OPTIONAL,

 supportedBandCombListPerBC-SL-RelayDiscovery-r17 BIT STRING (SIZE (1..maxBandComb)) OPTIONAL,

 supportedBandCombListPerBC-SL-NonRelayDiscovery-r17 BIT STRING (SIZE (1..maxBandComb)) OPTIONAL

}

BandCombination-v1720 ::= SEQUENCE {

 ca-ParametersNR-v1720 CA-ParametersNR-v1720 OPTIONAL,

 ca-ParametersNRDC-v1720 CA-ParametersNRDC-v1720 OPTIONAL

}

BandCombination-v1730 ::= SEQUENCE {

 ca-ParametersNR-v1730 CA-ParametersNR-v1730 OPTIONAL,

 ca-ParametersNRDC-v1730 CA-ParametersNRDC-v1730 OPTIONAL,

 bandList-v1730 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1730 OPTIONAL

}

BandCombination-v1740 ::= SEQUENCE {

 ca-ParametersNR-v1740 CA-ParametersNR-v1740 OPTIONAL

}

BandCombination-v17x0 ::= SEQUENCE {

 ca-ParametersNR-v17x0 CA-ParametersNR-v17x0 OPTIONAL,

 ca-ParametersNRDC-v17x0 CA-ParametersNRDC-v17x0 OPTIONAL,

 bandList-v17x0 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v17x0 OPTIONAL

}

BandCombination-UplinkTxSwitch-r16 ::= SEQUENCE {

 bandCombination-r16 BandCombination,

 bandCombination-v1540 BandCombination-v1540 OPTIONAL,

 bandCombination-v1560 BandCombination-v1560 OPTIONAL,

 bandCombination-v1570 BandCombination-v1570 OPTIONAL,

 bandCombination-v1580 BandCombination-v1580 OPTIONAL,

 bandCombination-v1590 BandCombination-v1590 OPTIONAL,

 bandCombination-v1610 BandCombination-v1610 OPTIONAL,

 supportedBandPairListNR-r16 SEQUENCE (SIZE (1..maxULTxSwitchingBandPairs)) OF ULTxSwitchingBandPair-r16,

 uplinkTxSwitching-OptionSupport-r16 ENUMERATED {switchedUL, dualUL, both} OPTIONAL,

 uplinkTxSwitching-PowerBoosting-r16 ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 -- R4 16-5 UL-MIMO coherence capability for dynamic Tx switching between 3CC 1Tx-2Tx switching

 uplinkTxSwitching-PUSCH-TransCoherence-r16 ENUMERATED {nonCoherent, fullCoherent} OPTIONAL

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}

BandCombination-UplinkTxSwitch-v1630 ::= SEQUENCE {

 bandCombination-v1630 BandCombination-v1630 OPTIONAL

}

BandCombination-UplinkTxSwitch-v1640 ::= SEQUENCE {

 bandCombination-v1640 BandCombination-v1640 OPTIONAL

}

BandCombination-UplinkTxSwitch-v1650 ::= SEQUENCE {

 bandCombination-v1650 BandCombination-v1650 OPTIONAL

}

BandCombination-UplinkTxSwitch-v1670 ::= SEQUENCE {

 bandCombination-v15g0 BandCombination-v15g0 OPTIONAL

}

BandCombination-UplinkTxSwitch-v1690 ::= SEQUENCE {

 bandCombination-v1690 BandCombination-v1690 OPTIONAL

}

BandCombination-UplinkTxSwitch-v16a0 ::= SEQUENCE {

 bandCombination-v16a0 BandCombination-v16a0 OPTIONAL

}

BandCombination-UplinkTxSwitch-v1700 ::= SEQUENCE {

 bandCombination-v1700 BandCombination-v1700 OPTIONAL,

 -- R4 16-1/16-2/16-3 Dynamic Tx switching between 2CC/3CC 2Tx-2Tx/1Tx-2Tx switching

 supportedBandPairListNR-v1700 SEQUENCE (SIZE (1..maxULTxSwitchingBandPairs)) OF ULTxSwitchingBandPair-v1700 OPTIONAL,

 -- R4 16-6: UL-MIMO coherence capability for dynamic Tx switching between 2Tx-2Tx switching

 uplinkTxSwitchingBandParametersList-v1700 SEQUENCE (SIZE (1.. maxSimultaneousBands)) OF UplinkTxSwitchingBandParameters-v1700 OPTIONAL

}

BandCombination-UplinkTxSwitch-v1720 ::= SEQUENCE {

 bandCombination-v1720 BandCombination-v1720 OPTIONAL,

 uplinkTxSwitching-OptionSupport2T2T-r17 ENUMERATED {switchedUL, dualUL, both} OPTIONAL

}

BandCombination-UplinkTxSwitch-v1730 ::= SEQUENCE {

 bandCombination-v1730 BandCombination-v1730 OPTIONAL

}

BandCombination-UplinkTxSwitch-v1740 ::= SEQUENCE {

 bandCombination-v1740 BandCombination-v1740 OPTIONAL

}

BandCombination-UplinkTxSwitch-v17x0 ::= SEQUENCE {

 bandCombination-v17x0 BandCombination-v17x0 OPTIONAL

}

ULTxSwitchingBandPair-r16 ::= SEQUENCE {

 bandIndexUL1-r16 INTEGER(1..maxSimultaneousBands),

 bandIndexUL2-r16 INTEGER(1..maxSimultaneousBands),

 uplinkTxSwitchingPeriod-r16 ENUMERATED {n35us, n140us, n210us},

 uplinkTxSwitching-DL-Interruption-r16 BIT STRING (SIZE(1..maxSimultaneousBands)) OPTIONAL

}

ULTxSwitchingBandPair-v1700 ::= SEQUENCE {

 uplinkTxSwitchingPeriod2T2T-r17 ENUMERATED {n35us, n140us, n210us} OPTIONAL

}

UplinkTxSwitchingBandParameters-v1700 ::= SEQUENCE {

 bandIndex-r17 INTEGER(1..maxSimultaneousBands),

 uplinkTxSwitching2T2T-PUSCH-TransCoherence-r17 ENUMERATED {nonCoherent, fullCoherent} OPTIONAL

}

BandParameters ::= CHOICE {

 eutra SEQUENCE {

 bandEUTRA FreqBandIndicatorEUTRA,

 ca-BandwidthClassDL-EUTRA CA-BandwidthClassEUTRA OPTIONAL,

 ca-BandwidthClassUL-EUTRA CA-BandwidthClassEUTRA OPTIONAL

 },

 nr SEQUENCE {

 bandNR FreqBandIndicatorNR,

 ca-BandwidthClassDL-NR CA-BandwidthClassNR OPTIONAL,

 ca-BandwidthClassUL-NR CA-BandwidthClassNR OPTIONAL

 }

}

BandParameters-v1540 ::= SEQUENCE {

 srs-CarrierSwitch CHOICE {

 nr SEQUENCE {

 srs-SwitchingTimesListNR SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingTimeNR

 },

 eutra SEQUENCE {

 srs-SwitchingTimesListEUTRA SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingTimeEUTRA

 }

 } OPTIONAL,

 srs-TxSwitch SEQUENCE {

 supportedSRS-TxPortSwitch ENUMERATED {t1r2, t1r4, t2r4, t1r4-t2r4, t1r1, t2r2, t4r4, notSupported},

 txSwitchImpactToRx INTEGER (1..32) OPTIONAL,

 txSwitchWithAnotherBand INTEGER (1..32) OPTIONAL

 } OPTIONAL

}

BandParameters-v1610 ::= SEQUENCE {

 srs-TxSwitch-v1610 SEQUENCE {

 supportedSRS-TxPortSwitch-v1610 ENUMERATED {t1r1-t1r2, t1r1-t1r2-t1r4, t1r1-t1r2-t2r2-t2r4, t1r1-t1r2-t2r2-t1r4-t2r4,

 t1r1-t2r2, t1r1-t2r2-t4r4}

 } OPTIONAL

}

BandParameters-v1710 ::= SEQUENCE {

 -- R1 23-8-3 SRS Antenna switching for >4Rx

 srs-AntennaSwitchingBeyond4RX-r17 SEQUENCE {

 -- 1. Support of SRS antenna switching xTyR with y>4

 supportedSRS-TxPortSwitchBeyond4Rx-r17 BIT STRING (SIZE (11)),

 -- 2. Report the entry number of the first-listed band with UL in the band combination that affects this DL

 entryNumberAffectBeyond4Rx-r17 INTEGER (1..32) OPTIONAL,

 -- 3. Report the entry number of the first-listed band with UL in the band combination that switches together with this UL

 entryNumberSwitchBeyond4Rx-r17 INTEGER (1..32) OPTIONAL

 } OPTIONAL

}

BandParameters-v1730 ::= SEQUENCE {

 -- R1 39-3-2 Affected bands for inter-band CA during SRS carrier switching

 srs-SwitchingAffectedBandsListNR-r17 SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingAffectedBandsNR-r17

}

BandParameters-v17x0 ::= SEQUENCE {

 supportedAggBW-FR2-r17 SEQUENCE {

 supportedAggBW-DL-r17 SupportedAggBandwidth-r17 OPTIONAL,

 supportedAggBW-UL-r17 SupportedAggBandwidth-r17 OPTIONAL

 } OPTIONAL,

 numMIMO-Layers-FR2-r17 SEQUENCE {

 numberMIMO-LayersDL-R17 MIMO-LayersDL-r17 OPTIONAL,

 numberMIMO-LayersUL-R17 MIMO-LayersUL-r17 OPTIONAL

 } OPTIONAL

}

ScalingFactorSidelink-r16 ::= ENUMERATED {f0p4, f0p75, f0p8, f1}

IntraBandPowerClass-r16 ::= ENUMERATED {pc2, pc3, spare6, spare5, spare4, spare3, spare2, spare1}

SRS-SwitchingAffectedBandsNR-r17 ::= BIT STRING (SIZE (1..maxSimultaneousBands))

-- TAG-BANDCOMBINATIONLIST-STOP

-- ASN1STOP

|  |
| --- |
| ***BandCombination* field descriptions** |
| ***BandCombinationList-v1540, BandCombinationList-v1550, BandCombinationList-v1560, BandCombinationList-v1570, BandCombinationList-v1580, BandCombinationList-v1590, BandCombinationList-v15g0, BandCombinationList-v1610*, *BandCombinationList-v1630*, *BandCombinationList-v1640*, *BandCombinationList-v1650, BandCombinationList-v1680, BandCombinationList-v1690, BandCombinationList-v16a0, BandCombinationList-v1700, BandCombinationList-v1720, BandCombinationList-v1730, BandCombinationList-v17x0***The UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList* (without suffix). If the field is included in *supportedBandCombinationListNEDC-Only-v1610*, the UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList* of *supportedBandCombinationListNEDC-Only* (without suffix) field.If the field is included in *supportedBandCombinationListNEDC-Only-v15a0*, the UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList* (without suffix) of *supportedBandCombinationListNEDC-Only* (without suffix) field. |
| ***BandCombinationList-UplinkTxSwitch-r16, BandCombinationList-UplinkTxSwitch-v1630, BandCombinationList-UplinkTxSwitch-v1640, BandCombinationList-UplinkTxSwitch-v1650, BandCombinationList-UplinkTxSwitch-v1690, BandCombinationList-UplinkTxSwitch-v16a0, BandCombinationList-UplinkTxSwitch-v1700, BandCombinationList-UplinkTxSwitch-v1720, BandCombinationList-UplinkTxSwitch-v1730, BandCombinationList-UplinkTxSwitch-v17x0***The UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList-UplinkTxSwitch-r16*.For the field of *supportedBandCombinationList-UplinkTxSwitch-v1700*, if the UE does not support 2Tx-2Tx switching for a given band combination, the field of *supportedBandPairListNR-v1700* in the corresponding entry is absent. |
| ***ca-ParametersNRDC***If the field is included for a band combination in the NR capability container, the field indicates support of NR-DC. Otherwise, the field is absent. |
| ***featureSetCombinationDAPS***If this field is present for a band combination, it reports the feature set combination supported for the band combination when any DAPS bearer is configured. |
| ***ne-DC-BC***If the field is included for a band combination in the MR-DC capability container, the field indicates support of NE-DC. Otherwise, the field is absent. |
| ***supportedBandPairListNR-r16, supportedBandPairListNR-v1700***Indicates a list of band pair supporting UL Tx switching as defined in TS 38.101-1 [15] for a given band combination.A UE supporting 2Tx-2Tx switching should include both of *supportedBandPairListNR-r16* and *supportedBandPairListNR-v1700*. And the UE shall include the same number of entries listed in the same order as in *supportedBandPairListNR-r16*.If the UE does not support 2Tx-2Tx switching for a given band pair, the field of *uplinkTxSwitchingPeriod2T2T* in the corresponding entry is absent. |
| ***srs-SwitchingTimesListNR***Indicates, for a particular pair of NR bands, the RF retuning time when switching between a NR carrier corresponding to this band entry and another (PUSCH-less) NR carrier corresponding to the band entry in the order indicated below:- For the first NR band, the UE shall include the same number of entries for NR bands as in *bandList*, i.e. first entry corresponds to first NR band in *bandList* and so on,- For the second NR band, the UE shall include one entry less, i.e. first entry corresponds to the second NR band in *bandList* and so on- And so on |
| ***srs-SwitchingTimesListEUTRA***Indicates, for a particular pair of E-UTRA bands, the RF retuning time when switching between an E-UTRA carrier corresponding to this band entry and another (PUSCH-less) E-UTRA carrier corresponding to the band entry in the order indicated below:- For the first E-UTRA band, the UE shall include the same number of entries for E-UTRA bands as in *bandList,* i.e. first entry corresponds to first E-UTRA band in *bandList* and so on,- For the second E-UTRA band, the UE shall include one entry less, i.e. first entry corresponds to the second E-UTRA band in *bandList* and so on - And so on |
| ***srs-TxSwitch***Indicates supported SRS antenna switch capability for the associated band. If the UE indicates support of *SRS-SwitchingTimeNR*, the UE is allowed to set this field for a band with associated *FeatureSetUplinkId* set to 0 for SRS carrier switching. |
| ***uplinkTxSwitchingBandParametersList-v1700***Indicates a list of per band per band combination capabilities for UL Tx switching. |

[…]

– *CA-ParametersNR*

The IE *CA-ParametersNR* contains carrier aggregation and inter-frequency DAPS handover related capabilities that are defined per band combination.

***CA-ParametersNR* information element**

-- ASN1START

-- TAG-CA-PARAMETERSNR-START

CA-ParametersNR ::= SEQUENCE {

 dummy ENUMERATED {supported} OPTIONAL,

 parallelTxSRS-PUCCH-PUSCH ENUMERATED {supported} OPTIONAL,

 parallelTxPRACH-SRS-PUCCH-PUSCH ENUMERATED {supported} OPTIONAL,

 simultaneousRxTxInterBandCA ENUMERATED {supported} OPTIONAL,

 simultaneousRxTxSUL ENUMERATED {supported} OPTIONAL,

 diffNumerologyAcrossPUCCH-Group ENUMERATED {supported} OPTIONAL,

 diffNumerologyWithinPUCCH-GroupSmallerSCS ENUMERATED {supported} OPTIONAL,

 supportedNumberTAG ENUMERATED {n2, n3, n4} OPTIONAL,

 ...

}

CA-ParametersNR-v1540 ::= SEQUENCE {

 simultaneousSRS-AssocCSI-RS-AllCC INTEGER (5..32) OPTIONAL,

 csi-RS-IM-ReceptionForFeedbackPerBandComb SEQUENCE {

 maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC INTEGER (1..64) OPTIONAL,

 totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC INTEGER (2..256) OPTIONAL

 } OPTIONAL,

 simultaneousCSI-ReportsAllCC INTEGER (5..32) OPTIONAL,

 dualPA-Architecture ENUMERATED {supported} OPTIONAL

}

CA-ParametersNR-v1550 ::= SEQUENCE {

 dummy ENUMERATED {supported} OPTIONAL

}

CA-ParametersNR-v1560 ::= SEQUENCE {

 diffNumerologyWithinPUCCH-GroupLargerSCS ENUMERATED {supported} OPTIONAL

}

CA-ParametersNR-v15g0 ::= SEQUENCE {

 simultaneousRxTxInterBandCAPerBandPair SimultaneousRxTxPerBandPair OPTIONAL,

 simultaneousRxTxSULPerBandPair SimultaneousRxTxPerBandPair OPTIONAL

}

CA-ParametersNR-v1610 ::= SEQUENCE {

 -- R1 9-3: Parallel MsgA and SRS/PUCCH/PUSCH transmissions across CCs in inter-band CA

 parallelTxMsgA-SRS-PUCCH-PUSCH-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 9-4: MsgA operation in a band combination including SUL

 msgA-SUL-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 10-9c: Joint search space group switching across multiple cells

 jointSearchSpaceSwitchAcrossCells-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 14-5: Half-duplex UE behaviour in TDD CA for same SCS

 half-DuplexTDD-CA-SameSCS-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 18-4: SCell dormancy within active time

 scellDormancyWithinActiveTime-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 18-4a: SCell dormancy outside active time

 scellDormancyOutsideActiveTime-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 18-6: Cross-carrier A-CSI RS triggering with different SCS

 crossCarrierA-CSI-trigDiffSCS-r16 ENUMERATED {higherA-CSI-SCS,lowerA-CSI-SCS,both} OPTIONAL,

 -- R1 18-6a: Default QCL assumption for cross-carrier A-CSI-RS triggering

 defaultQCL-CrossCarrierA-CSI-Trig-r16 ENUMERATED {diffOnly, both} OPTIONAL,

 -- R1 18-7: CA with non-aligned frame boundaries for inter-band CA

 interCA-NonAlignedFrame-r16 ENUMERATED {supported} OPTIONAL,

 simul-SRS-Trans-BC-r16 ENUMERATED {n2} OPTIONAL,

 interFreqDAPS-r16 SEQUENCE {

 interFreqAsyncDAPS-r16 ENUMERATED {supported} OPTIONAL,

 interFreqDiffSCS-DAPS-r16 ENUMERATED {supported} OPTIONAL,

 interFreqMultiUL-TransmissionDAPS-r16 ENUMERATED {supported} OPTIONAL,

 interFreqSemiStaticPowerSharingDAPS-Mode1-r16 ENUMERATED {supported} OPTIONAL,

 interFreqSemiStaticPowerSharingDAPS-Mode2-r16 ENUMERATED {supported} OPTIONAL,

 interFreqDynamicPowerSharingDAPS-r16 ENUMERATED {short, long} OPTIONAL,

 interFreqUL-TransCancellationDAPS-r16 ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 codebookParametersPerBC-r16 CodebookParameters-v1610 OPTIONAL,

 -- R1 16-2a-10 Value of R for BD/CCE

 blindDetectFactor-r16 INTEGER (1..2) OPTIONAL,

 -- R1 11-2a: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs per span when configured

 -- with DL CA with Rel-16 PDCCH monitoring capability on all the serving cells

 pdcch-MonitoringCA-r16 SEQUENCE {

 maxNumberOfMonitoringCC-r16 INTEGER (2..16),

 supportedSpanArrangement-r16 ENUMERATED {alignedOnly, alignedAndNonAligned}

 } OPTIONAL,

 -- R1 11-2c: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 16 and Rel. 15 PDCCH monitoring capabilities on

 -- different carriers

 pdcch-BlindDetectionCA-Mixed-r16 SEQUENCE {

 pdcch-BlindDetectionCA1-r16 INTEGER (1..15),

 pdcch-BlindDetectionCA2-r16 INTEGER (1..15),

 supportedSpanArrangement-r16 ENUMERATED {alignedOnly, alignedAndNonAligned}

 } OPTIONAL,

 -- R1 11-2d: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs per span for MCG and for

 -- SCG when configured for NR-DC operation with Rel-16 PDCCH monitoring capability on all the serving cells

 pdcch-BlindDetectionMCG-UE-r16 INTEGER (1..14) OPTIONAL,

 pdcch-BlindDetectionSCG-UE-r16 INTEGER (1..14) OPTIONAL,

 -- R1 11-2e: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 16 and

 -- Rel. 15 PDCCH monitoring capabilities on different carriers

 pdcch-BlindDetectionMCG-UE-Mixed-r16 SEQUENCE {

 pdcch-BlindDetectionMCG-UE1-r16 INTEGER (0..15),

 pdcch-BlindDetectionMCG-UE2-r16 INTEGER (0..15)

 } OPTIONAL,

 pdcch-BlindDetectionSCG-UE-Mixed-r16 SEQUENCE {

 pdcch-BlindDetectionSCG-UE1-r16 INTEGER (0..15),

 pdcch-BlindDetectionSCG-UE2-r16 INTEGER (0..15)

 } OPTIONAL,

 -- R1 18-5 cross-carrier scheduling with different SCS in DL CA

 crossCarrierSchedulingDL-DiffSCS-r16 ENUMERATED {low-to-high, high-to-low, both} OPTIONAL,

 -- R1 18-5a Default QCL assumption for cross-carrier scheduling

 crossCarrierSchedulingDefaultQCL-r16 ENUMERATED {diff-only, both} OPTIONAL,

 -- R1 18-5b cross-carrier scheduling with different SCS in UL CA

 crossCarrierSchedulingUL-DiffSCS-r16 ENUMERATED {low-to-high, high-to-low, both} OPTIONAL,

 -- R1 13.19a Simultaneous positioning SRS and MIMO SRS transmission for a given BC

 simul-SRS-MIMO-Trans-BC-r16 ENUMERATED {n2} OPTIONAL,

 -- R1 16-3a, 16-3a-1, 16-3b, 16-3b-1: New Individual Codebook

 codebookParametersAdditionPerBC-r16 CodebookParametersAdditionPerBC-r16 OPTIONAL,

 -- R1 16-8: Mixed codebook

 codebookComboParametersAdditionPerBC-r16 CodebookComboParametersAdditionPerBC-r16 OPTIONAL

}

CA-ParametersNR-v1630 ::= SEQUENCE {

 -- R1 22-5b: Simultaneous transmission of SRS for antenna switching and SRS for CB/NCB /BM for inter-band UL CA

 -- R1 22-5d: Simultaneous transmission of SRS for antenna switching for inter-band UL CA

 simulTX-SRS-AntSwitchingInterBandUL-CA-r16 SimulSRS-ForAntennaSwitching-r16 OPTIONAL,

 -- R4 8-5: supported beam management type for inter-band CA

 beamManagementType-r16 ENUMERATED {ibm, dummy} OPTIONAL,

 -- R4 7-3a: UL frequency separation class with aggregate BW and Gap BW

 intraBandFreqSeparationUL-AggBW-GapBW-r16 ENUMERATED {classI, classII, classIII} OPTIONAL,

 -- RAN 89: Case B in case of Inter-band CA with non-aligned frame boundaries

 interCA-NonAlignedFrame-B-r16 ENUMERATED {supported} OPTIONAL

}

CA-ParametersNR-v1640 ::= SEQUENCE {

 -- R4 7-5: Support of reporting UL Tx DC locations for uplink intra-band CA.

 uplinkTxDC-TwoCarrierReport-r16 ENUMERATED {supported} OPTIONAL,

 -- RAN 22-6: Support of up to 3 different numerologies in the same NR PUCCH group for NR part of EN-DC, NGEN-DC, NE-DC and NR-CA

 -- where UE is not configured with two NR PUCCH groups

 maxUpTo3Diff-NumerologiesConfigSinglePUCCH-grp-r16 PUCCH-Grp-CarrierTypes-r16 OPTIONAL,

 -- RAN 22-6a: Support of up to 4 different numerologies in the same NR PUCCH group for NR part of EN-DC, NGEN-DC, NE-DC and NR-CA

 -- where UE is not configured with two NR PUCCH groups

 maxUpTo4Diff-NumerologiesConfigSinglePUCCH-grp-r16 PUCCH-Grp-CarrierTypes-r16 OPTIONAL,

 -- RAN 22-7: Support two PUCCH groups for NR-CA with 3 or more bands with at least two carrier types

 twoPUCCH-Grp-ConfigurationsList-r16 SEQUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r16)) OF TwoPUCCH-Grp-Configurations-r16 OPTIONAL,

 -- R1 22-7a: Different numerology across NR PUCCH groups

 diffNumerologyAcrossPUCCH-Group-CarrierTypes-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 22-7b: Different numerologies across NR carriers within the same NR PUCCH group, with PUCCH on a carrier of smaller SCS

 diffNumerologyWithinPUCCH-GroupSmallerSCS-CarrierTypes-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 22-7c: Different numerologies across NR carriers within the same NR PUCCH group, with PUCCH on a carrier of larger SCS

 diffNumerologyWithinPUCCH-GroupLargerSCS-CarrierTypes-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 11-2f: add the replicated FGs of 11-2a/c with restriction for non-aligned span case

 -- with DL CA with Rel-16 PDCCH monitoring capability on all the serving cells

 pdcch-MonitoringCA-NonAlignedSpan-r16 INTEGER (2..16) OPTIONAL,

 -- R1 11-2g: add the replicated FGs of 11-2a/c with restriction for non-aligned span case

 pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-r16 SEQUENCE {

 pdcch-BlindDetectionCA1-r16 INTEGER (1..15),

 pdcch-BlindDetectionCA2-r16 INTEGER (1..15)

 } OPTIONAL

}

CA-ParametersNR-v1690 ::= SEQUENCE {

 csi-ReportingCrossPUCCH-Grp-r16 SEQUENCE {

 computationTimeForA-CSI-r16 ENUMERATED {sameAsNoCross, relaxed},

 additionalSymbols-r16 SEQUENCE {

 scs-15kHz-additionalSymbols-r16 ENUMERATED {s14, s28} OPTIONAL,

 scs-30kHz-additionalSymbols-r16 ENUMERATED {s14, s28} OPTIONAL,

 scs-60kHz-additionalSymbols-r16 ENUMERATED {s14, s28, s56} OPTIONAL,

 scs-120kHz-additionalSymbols-r16 ENUMERATED {s14, s28, s56} OPTIONAL

 } OPTIONAL,

 sp-CSI-ReportingOnPUCCH-r16 ENUMERATED {supported} OPTIONAL,

 sp-CSI-ReportingOnPUSCH-r16 ENUMERATED {supported} OPTIONAL,

 carrierTypePairList-r16 SEQUENCE (SIZE (1..maxCarrierTypePairList-r16)) OF CarrierTypePair-r16

 } OPTIONAL

}

CA-ParametersNR-v16a0 ::= SEQUENCE {

 pdcch-BlindDetectionMixedList-r16 SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetectionMixed-1-r16)) OF PDCCH-BlindDetectionMixedList-r16

}

CA-ParametersNR-v1700 ::= SEQUENCE {

 -- R1 23-9-1: Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II) per band combination information

 codebookParametersfetype2PerBC-r17 CodebookParametersfetype2PerBC-r17 OPTIONAL,

 -- R4 18-4: Support of enhanced Demodulation requirements for CA in HST SFN FR1

 demodulationEnhancementCA-r17 ENUMERATED {supported} OPTIONAL,

 -- R4 20-1: Maximum uplink duty cycle for NR inter-band CA power class 2

 maxUplinkDutyCycle-interBandCA-PC2-r17 ENUMERATED {n50, n60, n70, n80, n90, n100} OPTIONAL,

 -- R4 20-2: Maximum uplink duty cycle for NR SUL combination power class 2

 maxUplinkDutyCycle-SULcombination-PC2-r17 ENUMERATED {n50, n60, n70, n80, n90, n100} OPTIONAL,

 beamManagementType-CBM-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 25-18: Parallel PUCCH and PUSCH transmission across CCs in inter-band CA

 parallelTxPUCCH-PUSCH-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 23-9-5 Active CSI-RS resources and ports for mixed codebook types in any slot per band combination

 codebookComboParameterMixedTypePerBC-r17 CodebookComboParameterMixedTypePerBC-r17 OPTIONAL,

 -- R1 23-7-1 Basic Features of CSI Enhancement for Multi-TRP

 mTRP-CSI-EnhancementPerBC-r17 SEQUENCE {

 maxNumNZP-CSI-RS-r17 INTEGER (2..8),

 cSI-Report-mode-r17 ENUMERATED {mode1, mode2, both},

 supportedComboAcrossCCs-r17 SEQUENCE (SIZE (1..16)) OF CSI-MultiTRP-SupportedCombinations-r17,

 codebookMode-NCJT-r17 ENUMERATED{mode1,mode1And2}

 } OPTIONAL,

 -- R1 23-7-1b Active CSI-RS resources and ports in the presence of multi-TRP CSI

 codebookComboParameterMultiTRP-PerBC-r17 CodebookComboParameterMultiTRP-PerBC-r17 OPTIONAL,

 -- R1 24-8b: 32 DL HARQ processes for FR 2-2 - maximum number of component carriers

 maxCC-32-DL-HARQ-ProcessFR2-2-r17 ENUMERATED {n1, n2, n3, n4, n6, n8, n16, n32} OPTIONAL,

 -- R1 24-9b: 32 UL HARQ processes for FR 2-2 - maximum number of component carriers

 maxCC-32-UL-HARQ-ProcessFR2-2-r17 ENUMERATED {n1, n2, n3, n4, n5, n8, n16, n32} OPTIONAL,

 -- R1 34-2: Cross-carrier scheduling from SCell to PCell/PSCell (Type B)

 crossCarrierSchedulingSCell-SpCellTypeB-r17 CrossCarrierSchedulingSCell-SpCell-r17 OPTIONAL,

-- R1 34-1: Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A)

 crossCarrierSchedulingSCell-SpCellTypeA-r17 CrossCarrierSchedulingSCell-SpCell-r17 OPTIONAL,

 -- R1 34-1a: DCI formats on PCell/PSCell USS set(s) support

 dci-FormatsPCellPSCellUSS-Sets-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 34-3: Disabling scaling factor alpha when sSCell is deactivated

 disablingScalingFactorDeactSCell-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 34-4: Disabling scaling factor alpha when sSCell is deactivated

 disablingScalingFactorDormantSCell-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 34-5: Non-aligned frame boundaries between PCell/PSCell and sSCell

 non-AlignedFrameBoundaries-r17 SEQUENCE {

 scs15kHz-15kHz-r17 BIT STRING (SIZE (1..496)) OPTIONAL,

 scs15kHz-30kHz-r17 BIT STRING (SIZE (1..496)) OPTIONAL,

 scs15kHz-60kHz-r17 BIT STRING (SIZE (1..496)) OPTIONAL,

 scs30kHz-30kHz-r17 BIT STRING (SIZE (1..496)) OPTIONAL,

 scs30kHz-60kHz-r17 BIT STRING (SIZE (1..496)) OPTIONAL,

 scs60kHz-60kHz-r17 BIT STRING (SIZE (1..496)) OPTIONAL

 } OPTIONAL

}

CA-ParametersNR-v1720 ::= SEQUENCE {

 -- R1 39-1: Parallel SRS and PUCCH/PUSCH transmission across CCs in intra-band non-contiguous CA

 parallelTxSRS-PUCCH-PUSCH-intraBand-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 39-2: Parallel PRACH and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA

 parallelTxPRACH-SRS-PUCCH-PUSCH-intraBand-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 25-9: Semi-static PUCCH cell switching for a single PUCCH group only

 semiStaticPUCCH-CellSwitchSingleGroup-r17 SEQUENCE {

 pucch-Group-r17 ENUMERATED {primaryGroupOnly, secondaryGroupOnly, eitherPrimaryOrSecondaryGroup},

 pucch-Group-Config-r17 PUCCH-Group-Config-r17

 } OPTIONAL,

 -- R1 25-9a: Semi-static PUCCH cell switching for two PUCCH groups

 semiStaticPUCCH-CellSwitchTwoGroups-r17 SEQUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r17)) OF TwoPUCCH-Grp-Configurations-r17 OPTIONAL,

 -- R1 25-10: PUCCH cell switching based on dynamic indication for same length of overlapping PUCCH slots/sub-slots for a single

 -- PUCCH group only

 dynamicPUCCH-CellSwitchSameLengthSingleGroup-r17 SEQUENCE {

 pucch-Group-r17 ENUMERATED {primaryGroupOnly, secondaryGroupOnly, eitherPrimaryOrSecondaryGroup},

 pucch-Group-Config-r17 PUCCH-Group-Config-r17

 } OPTIONAL,

 -- R1 25-10a: PUCCH cell switching based on dynamic indication for different length of overlapping PUCCH slots/sub-slots

 -- for a single PUCCH group only

 dynamicPUCCH-CellSwitchDiffLengthSingleGroup-r17 SEQUENCE {

 pucch-Group-r17 ENUMERATED {primaryGroupOnly, secondaryGroupOnly, eitherPrimaryOrSecondaryGroup},

 pucch-Group-Config-r17 PUCCH-Group-Config-r17

 } OPTIONAL,

 -- R1 25-10b: PUCCH cell switching based on dynamic indication for same length of overlapping PUCCH slots/sub-slots for two PUCCH

 -- groups

 dynamicPUCCH-CellSwitchSameLengthTwoGroups-r17 SEQUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r17)) OF TwoPUCCH-Grp-Configurations-r17

 OPTIONAL,

 -- R1 25-10c: PUCCH cell switching based on dynamic indication for different length of overlapping PUCCH slots/sub-slots for two

 -- PUCCH groups

 dynamicPUCCH-CellSwitchDiffLengthTwoGroups-r17 SEQUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r17)) OF TwoPUCCH-Grp-Configurations-r17

 OPTIONAL,

 -- R1 33-2a: ACK/NACK based HARQ-ACK feedback and RRC-based enabling/disabling ACK/NACK-based

 -- feedback for dynamic scheduling for multicast

 ack-NACK-FeedbackForMulticast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-2d: PTP retransmission for multicast dynamic scheduling

 ptp-Retx-Multicast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-4: NACK-only based HARQ-ACK feedback for RRC-based enabling/disabling multicast with ACK/NACK transforming

 nack-OnlyFeedbackForMulticast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-4a: NACK-only based HARQ-ACK feedback for multicast corresponding to a specific sequence or a PUCCH transmission

 nack-OnlyFeedbackSpecificResourceForMulticast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-5-1a: ACK/NACK based HARQ-ACK feedback and RRC-based enabling/disabling ACK/NACK-based feedback

 -- for SPS group-common PDSCH for multicast

 ack-NACK-FeedbackForSPS-Multicast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-5-1d: PTP retransmission for SPS group-common PDSCH for multicast

 ptp-Retx-SPS-Multicast-r17 ENUMERATED {supported} OPTIONAL,

 -- R4 26-1: Higher Power Limit CA DC

 higherPowerLimit-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 39-4: Parallel MsgA and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA

 parallelTxMsgA-SRS-PUCCH-PUSCH-intraBand-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 24-11a: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs per span when

 -- configured with DL CA with Rel-17 PDCCH monitoring capability on all the serving cells

 pdcch-MonitoringCA-r17 INTEGER (4..16) OPTIONAL,

 -- R1 24-11f: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs for MCG and for SCG

 -- when configured for NR-DC operation with Rel-17 PDCCH monitoring capability on all the serving cells

 pdcch-BlindDetectionMCG-SCG-List-r17 SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMCG-SCG-r17

 OPTIONAL,

 -- R1 24-11c: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17 and Rel. 15 PDCCH monitoring capabilities on

 -- different Carriers

 -- R1 24-11g: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17 and

 -- Rel. 15 PDCCH monitoring capabilities on different carriers

 pdcch-BlindDetectionMixedList1-r17 SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMixed-r17

 OPTIONAL,

 -- R1 24-11d: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17 and Rel. 16 PDCCH monitoring capabilities on

 -- different Carriers

 -- R1 24-11h: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17 and

 -- Rel. 16 PDCCH monitoring capabilities on different carriers

 pdcch-BlindDetectionMixedList2-r17 SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMixed-r17

 OPTIONAL,

 -- R1 24-11e: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17, Rel. 16 and Rel. 15 PDCCH monitoring

 -- capabilities on different carriers

 -- R1 24-11i: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17,

 -- Rel. 16 and Rel. 15 PDCCH monitoring capabilities on different carriers

 pdcch-BlindDetectionMixedList3-r17 SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMixed1-r17

 OPTIONAL

}

CA-ParametersNR-v1730 ::= SEQUENCE {

 -- R1 30-4a: DM-RS bundling for PUSCH repetition type A (per BC)

 dmrs-BundlingPUSCH-RepTypeAPerBC-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4b: DM-RS bundling for PUSCH repetition type B(per BC)

 dmrs-BundlingPUSCH-RepTypeBPerBC-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4c: DM-RS bundling for TB processing over multi-slot PUSCH(per BC)

 dmrs-BundlingPUSCH-multiSlotPerBC-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4d: DMRS bundling for PUCCH repetitions(per BC)

 dmrs-BundlingPUCCH-RepPerBC-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4g: Restart DM-RS bundling (per BC)

 dmrs-BundlingRestartPerBC-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4h: DM-RS bundling for non-back-to-back transmission (per BC)

 dmrs-BundlingNonBackToBackTX-PerBC-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 39-3-1: Stay on the target CC for SRS carrier switching

 stayOnTargetCC-SRS-CarrierSwitch-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-3-3a: FDM-ed Type-1 and Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast

 fdm-CodebookForMux-UnicastMulticastHARQ-ACK-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-3-3b: Mode 2 TDM-ed Type-1 and Type-2 HARQ-ACK codebook for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast

 mode2-TDM-CodebookForMux-UnicastMulticastHARQ-ACK-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-3-4: Mode 1 for type1 codebook generation

 mode1-ForType1-CodebookGeneration-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-5-1j: NACK-only based HARQ-ACK feedback for multicast corresponding to a specific sequence or a PUCCH transmission

 -- for SPS group-commmon PDSCH for multicast

 nack-OnlyFeedbackSpecificResourceForSPS-Multicast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-8-2: Up to 2 PUCCH resources configuration for multicast feedback for dynamically scheduled multicast

 multiPUCCH-ConfigForMulticast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-8-3: PUCCH resource configuration for multicast feedback for SPS GC-PDSCH

 pucch-ConfigForSPS-Multicast-r17 ENUMERATED {supported} OPTIONAL,

 -- The following parameter is associated with R1 33-2a, R1 33-3-3a, and R1 33-3-3b, and is not a RAN1 FG.

 maxNumberG-RNTI-HARQ-ACK-Codebook-r17 INTEGER (1..4) OPTIONAL,

 -- R1 33-3-5: Feedback multiplexing for unicast PDSCH and group-common PDSCH for multicast with same priority and different codebook

 -- type

 mux-HARQ-ACK-UnicastMulticast-r17 ENUMERATED {supported} OPTIONAL

}

CA-ParametersNR-v1740 ::= SEQUENCE {

 -- R1 33-5-1f: NACK-only based HARQ-ACK feedback for multicast RRC-based enabling/disabling NACK-only based feedback

 -- for SPS group-common PDSCH for multicast

 nack-OnlyFeedbackForSPS-Multicast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-8-1: PUCCH resource configuration for multicast feedback for dynamically scheduled multicast

 singlePUCCH-ConfigForMulticast-r17 ENUMERATED {supported} OPTIONAL

}

CA-ParametersNR-v17x0 ::= SEQUENCE {

 supportedAggBW-InterBandCA-FR1-r17 SEQUENCE {

 supportedAggBW-FDD-DL-r17 SupportedAggBandwidth-r17 OPTIONAL,

 supportedAggBW-FDD-UL-r17 SupportedAggBandwidth-r17 OPTIONAL,

 supportedAggBW-TDD-DL-r17 SupportedAggBandwidth-r17 OPTIONAL,

 supportedAggBW-TDD-UL-r17 SupportedAggBandwidth-r17 OPTIONAL,

 supportedAggBW-TotalDL-r17 SupportedAggBandwidth-r17 OPTIONAL,

 supportedAggBW-TotalUL-r17 SupportedAggBandwidth-r17 OPTIONAL

 } OPTIONAL,

 numMIMO-Layers-InterBandCA-FR1-r17 SEQUENCE {

 numberMIMO-LayersDL-R17 MIMO-LayersDL-r17 OPTIONAL,

 numberMIMO-LayersUL-R17 MIMO-LayersUL-r17 OPTIONAL

 } OPTIONAL

}

CrossCarrierSchedulingSCell-SpCell-r17 ::= SEQUENCE {

 supportedSCS-Combinations-r17 SEQUENCE {

 scs15kHz-15kHz-r17 ENUMERATED {supported} OPTIONAL,

 scs15kHz-30kHz-r17 ENUMERATED {supported} OPTIONAL,

 scs15kHz-60kHz-r17 ENUMERATED {supported} OPTIONAL,

 scs30kHz-30kHz-r17 BIT STRING (SIZE (1..496)) OPTIONAL,

 scs30kHz-60kHz-r17 BIT STRING (SIZE (1..496)) OPTIONAL,

 scs60kHz-60kHz-r17 BIT STRING (SIZE (1..496)) OPTIONAL

 },

 pdcch-MonitoringOccasion-r17 ENUMERATED {val1, val2}

}

PDCCH-BlindDetectionMixedList-r16::= SEQUENCE {

 pdcch-BlindDetectionCA-MixedExt-r16 CHOICE {

 pdcch-BlindDetectionCA-Mixed-v16a0 PDCCH-BlindDetectionCA-MixedExt-r16,

 pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-v16a0 PDCCH-BlindDetectionCA-MixedExt-r16

 } OPTIONAL,

 pdcch-BlindDetectionCG-UE-MixedExt-r16 SEQUENCE{

 pdcch-BlindDetectionMCG-UE-Mixed-v16a0 PDCCH-BlindDetectionCG-UE-MixedExt-r16,

 pdcch-BlindDetectionSCG-UE-Mixed-v16a0 PDCCH-BlindDetectionCG-UE-MixedExt-r16

 } OPTIONAL

}

PDCCH-BlindDetectionCA-MixedExt-r16 ::= SEQUENCE {

 pdcch-BlindDetectionCA1-r16 INTEGER (1..15),

 pdcch-BlindDetectionCA2-r16 INTEGER (1..15)

}

PDCCH-BlindDetectionCG-UE-MixedExt-r16 ::= SEQUENCE {

 pdcch-BlindDetectionCG-UE1-r16 INTEGER (0..15),

 pdcch-BlindDetectionCG-UE2-r16 INTEGER (0..15)

}

PDCCH-BlindDetectionMCG-SCG-r17 ::= SEQUENCE {

 pdcch-BlindDetectionMCG-UE-r17 INTEGER (1..15),

 pdcch-BlindDetectionSCG-UE-r17 INTEGER (1..15)

}

PDCCH-BlindDetectionMixed-r17::= SEQUENCE {

 pdcch-BlindDetectionCA-Mixed-r17 PDCCH-BlindDetectionCA-Mixed-r17 OPTIONAL,

 pdcch-BlindDetectionCG-UE-Mixed-r17 SEQUENCE{

 pdcch-BlindDetectionMCG-UE-Mixed-v17 PDCCH-BlindDetectionCG-UE-Mixed-r17,

 pdcch-BlindDetectionSCG-UE-Mixed-v17 PDCCH-BlindDetectionCG-UE-Mixed-r17

 } OPTIONAL

}

PDCCH-BlindDetectionCG-UE-Mixed-r17 ::= SEQUENCE {

 pdcch-BlindDetectionCG-UE1-r17 INTEGER (0..15),

 pdcch-BlindDetectionCG-UE2-r17 INTEGER (0..15)

}

PDCCH-BlindDetectionCA-Mixed-r17 ::= SEQUENCE {

 pdcch-BlindDetectionCA1-r17 INTEGER (1..15) OPTIONAL,

 pdcch-BlindDetectionCA2-r17 INTEGER (1..15) OPTIONAL

}

PDCCH-BlindDetectionMixed1-r17::= SEQUENCE {

 pdcch-BlindDetectionCA-Mixed1-r17 PDCCH-BlindDetectionCA-Mixed1-r17 OPTIONAL,

 pdcch-BlindDetectionCG-UE-Mixed1-r17 SEQUENCE{

 pdcch-BlindDetectionMCG-UE-Mixed1-v17 PDCCH-BlindDetectionCG-UE-Mixed1-r17,

 pdcch-BlindDetectionSCG-UE-Mixed1-v17 PDCCH-BlindDetectionCG-UE-Mixed1-r17

 } OPTIONAL

}

PDCCH-BlindDetectionCG-UE-Mixed1-r17 ::= SEQUENCE {

 pdcch-BlindDetectionCG-UE1-r17 INTEGER (0..15),

 pdcch-BlindDetectionCG-UE2-r17 INTEGER (0..15),

 pdcch-BlindDetectionCG-UE3-r17 INTEGER (0..15)

}

PDCCH-BlindDetectionCA-Mixed1-r17 ::= SEQUENCE {

 pdcch-BlindDetectionCA1-r17 INTEGER (1..15) OPTIONAL,

 pdcch-BlindDetectionCA2-r17 INTEGER (1..15) OPTIONAL,

 pdcch-BlindDetectionCA3-r17 INTEGER (1..15) OPTIONAL

}

SimulSRS-ForAntennaSwitching-r16 ::= SEQUENCE {

 supportSRS-xTyR-xLessThanY-r16 ENUMERATED {supported} OPTIONAL,

 supportSRS-xTyR-xEqualToY-r16 ENUMERATED {supported} OPTIONAL,

 supportSRS-AntennaSwitching-r16 ENUMERATED {supported} OPTIONAL

}

TwoPUCCH-Grp-Configurations-r16 ::= SEQUENCE {

 pucch-PrimaryGroupMapping-r16 TwoPUCCH-Grp-ConfigParams-r16,

 pucch-SecondaryGroupMapping-r16 TwoPUCCH-Grp-ConfigParams-r16

}

TwoPUCCH-Grp-Configurations-r17 ::= SEQUENCE {

 primaryPUCCH-GroupConfig-r17 PUCCH-Group-Config-r17,

 secondaryPUCCH-GroupConfig-r17 PUCCH-Group-Config-r17

}

TwoPUCCH-Grp-ConfigParams-r16 ::= SEQUENCE {

 pucch-GroupMapping-r16 PUCCH-Grp-CarrierTypes-r16,

 pucch-TX-r16 PUCCH-Grp-CarrierTypes-r16

}

CarrierTypePair-r16 ::= SEQUENCE {

 carrierForCSI-Measurement-r16 PUCCH-Grp-CarrierTypes-r16,

 carrierForCSI-Reporting-r16 PUCCH-Grp-CarrierTypes-r16

}

PUCCH-Grp-CarrierTypes-r16 ::= SEQUENCE {

 fr1-NonSharedTDD-r16 ENUMERATED {supported} OPTIONAL,

 fr1-SharedTDD-r16 ENUMERATED {supported} OPTIONAL,

 fr1-NonSharedFDD-r16 ENUMERATED {supported} OPTIONAL,

 fr2-r16 ENUMERATED {supported} OPTIONAL

}

PUCCH-Group-Config-r17 ::= SEQUENCE {

 fr1-FR1-NonSharedTDD-r17 ENUMERATED {supported} OPTIONAL,

 fr2-FR2-NonSharedTDD-r17 ENUMERATED {supported} OPTIONAL,

 fr1-FR2-NonSharedTDD-r17 ENUMERATED {supported} OPTIONAL

}

-- TAG-CA-PARAMETERSNR-STOP

-- ASN1STOP

|  |
| --- |
| ***CA-ParametersNR* field description** |
| ***codebookParametersPerBC***For a given supported band combination, this field indicates the alternative list of *SupportedCSI-RS-Resource* supported for each codebook type, amongst the supported CSI-RS resources included in *codebookParametersPerBand* in *MIMO-ParametersPerBand*. |

– *CA-ParametersNRDC*

The IE *CA-ParametersNRDC* contains dual connectivity related capabilities that are defined per band combination.

***CA-ParametersNRDC* information element**

-- ASN1START

-- TAG-CA-PARAMETERS-NRDC-START

CA-ParametersNRDC ::= SEQUENCE {

 ca-ParametersNR-ForDC CA-ParametersNR OPTIONAL,

 ca-ParametersNR-ForDC-v1540 CA-ParametersNR-v1540 OPTIONAL,

 ca-ParametersNR-ForDC-v1550 CA-ParametersNR-v1550 OPTIONAL,

 ca-ParametersNR-ForDC-v1560 CA-ParametersNR-v1560 OPTIONAL,

 featureSetCombinationDC FeatureSetCombinationId OPTIONAL

}

CA-ParametersNRDC-v15g0 ::= SEQUENCE {

 ca-ParametersNR-ForDC-v15g0 CA-ParametersNR-v15g0 OPTIONAL

}

CA-ParametersNRDC-v1610 ::= SEQUENCE {

 -- R1 18-1: Semi-static power sharing mode1 between MCG and SCG cells of same FR for NR dual connectivity

 intraFR-NR-DC-PwrSharingMode1-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 18-1a: Semi-static power sharing mode 2 between MCG and SCG cells of same FR for NR dual connectivity

 intraFR-NR-DC-PwrSharingMode2-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 18-1b: Dynamic power sharing between MCG and SCG cells of same FR for NR dual connectivity

 intraFR-NR-DC-DynamicPwrSharing-r16 ENUMERATED {short, long} OPTIONAL,

 asyncNRDC-r16 ENUMERATED {supported} OPTIONAL

}

CA-ParametersNRDC-v1630 ::= SEQUENCE {

 ca-ParametersNR-ForDC-v1610 CA-ParametersNR-v1610 OPTIONAL,

 ca-ParametersNR-ForDC-v1630 CA-ParametersNR-v1630 OPTIONAL

}

CA-ParametersNRDC-v1640 ::= SEQUENCE {

 ca-ParametersNR-ForDC-v1640 CA-ParametersNR-v1640 OPTIONAL

}

CA-ParametersNRDC-v1650 ::= SEQUENCE {

 supportedCellGrouping-r16 BIT STRING (SIZE (1..maxCellGroupings-r16)) OPTIONAL

}

CA-ParametersNRDC-v16a0 ::= SEQUENCE {

 ca-ParametersNR-ForDC-v16a0 CA-ParametersNR-v16a0 OPTIONAL

}

CA-ParametersNRDC-v1700 ::= SEQUENCE {

 -- R1 31-9: Indicates the support of simultaneous transmission and reception of an IAB-node from multiple parent nodes

 simultaneousRxTx-IAB-MultipleParents-r17 ENUMERATED {supported} OPTIONAL,

 condPSCellAdditionNRDC-r17 ENUMERATED {supported} OPTIONAL,

 scg-ActivationDeactivationNRDC-r17 ENUMERATED {supported} OPTIONAL,

 scg-ActivationDeactivationResumeNRDC-r17 ENUMERATED {supported} OPTIONAL,

 beamManagementType-CBM-r17 ENUMERATED {supported} OPTIONAL

}

CA-ParametersNRDC-v1720 ::= SEQUENCE {

 ca-ParametersNR-ForDC-v1700 CA-ParametersNR-v1700 OPTIONAL,

 ca-ParametersNR-ForDC-v1720 CA-ParametersNR-v1720 OPTIONAL

}

CA-ParametersNRDC-v1730 ::= SEQUENCE {

 ca-ParametersNR-ForDC-v1730 CA-ParametersNR-v1730 OPTIONAL

}

CA-ParametersNRDC-v17x0 ::= SEQUENCE {

 ca-ParametersNR-ForDC-v17X0 CA-ParametersNR-v17x0 OPTIONAL

}

-- TAG-CA-PARAMETERS-NRDC-STOP

-- ASN1STOP

|  |
| --- |
| ***CA-ParametersNRDC* field descriptions** |
| ***ca-ParametersNR-forDC (with and without suffix)***If this field is present for a band combination, it reports the UE capabilities when NR-DC is configured with the band combination. If a version of this field (i.e., with or without suffix) is absent for a band combination, the corresponding *ca-ParametersNR* field version in *BandCombination* is applicable to the UE configured with NR-DC for the band combination. If a version of this field (i.e., with or without suffix) is present for a band combination but does not contain any parameters, the UE does not support the corresponding field version when configured with NR-DC for the band combination. |
| ***featureSetCombinationDC***If this field is present for a band combination, it reports the feature set combination supported for the band combination when NR-DC is configured. If this field is absent for a band combination, the *featureSetCombination* in *BandCombination* (without suffix) is applicable to the UE configured with NR-DC for the band combination. |

[…]

– *RF-Parameters*

The IE *RF-Parameters* is used to convey RF-related capabilities for NR operation.

***RF-Parameters* information element**

-- ASN1START

-- TAG-RF-PARAMETERS-START

RF-Parameters ::= SEQUENCE {

 supportedBandListNR SEQUENCE (SIZE (1..maxBands)) OF BandNR,

 supportedBandCombinationList BandCombinationList OPTIONAL,

 appliedFreqBandListFilter FreqBandList OPTIONAL,

 ...,

 [[

 supportedBandCombinationList-v1540 BandCombinationList-v1540 OPTIONAL,

 srs-SwitchingTimeRequested ENUMERATED {true} OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1550 BandCombinationList-v1550 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1560 BandCombinationList-v1560 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1610 BandCombinationList-v1610 OPTIONAL,

 supportedBandCombinationListSidelinkEUTRA-NR-r16 BandCombinationListSidelinkEUTRA-NR-r16 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-r16 BandCombinationList-UplinkTxSwitch-r16 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1630 BandCombinationList-v1630 OPTIONAL,

 supportedBandCombinationListSidelinkEUTRA-NR-v1630 BandCombinationListSidelinkEUTRA-NR-v1630 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1630 BandCombinationList-UplinkTxSwitch-v1630 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1640 BandCombinationList-v1640 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1640 BandCombinationList-UplinkTxSwitch-v1640 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1650 BandCombinationList-v1650 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1650 BandCombinationList-UplinkTxSwitch-v1650 OPTIONAL

 ]],

 [[

 extendedBand-n77-r16 ENUMERATED {supported} OPTIONAL

 ]],

 [[

 supportedBandCombinationList-UplinkTxSwitch-v1670 BandCombinationList-UplinkTxSwitch-v1670 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1680 BandCombinationList-v1680 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1690 BandCombinationList-v1690 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1690 BandCombinationList-UplinkTxSwitch-v1690 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1700 BandCombinationList-v1700 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1700 BandCombinationList-UplinkTxSwitch-v1700 OPTIONAL,

 supportedBandCombinationListSL-RelayDiscovery-r17 OCTET STRING OPTIONAL, -- Contains PC5 BandCombinationListSidelinkNR-r16

 supportedBandCombinationListSL-NonRelayDiscovery-r17 OCTET STRING OPTIONAL, -- Contains PC5 BandCombinationListSidelinkNR-r16

 supportedBandCombinationListSidelinkEUTRA-NR-v1710 BandCombinationListSidelinkEUTRA-NR-v1710 OPTIONAL,

 sidelinkRequested-r17 ENUMERATED {true} OPTIONAL,

 extendedBand-n77-2-r17 ENUMERATED {supported} OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1720 BandCombinationList-v1720 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1720 BandCombinationList-UplinkTxSwitch-v1720 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1730 BandCombinationList-v1730 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1730 BandCombinationList-UplinkTxSwitch-v1730 OPTIONAL,

 supportedBandCombinationListSL-RelayDiscovery-v1730 BandCombinationListSL-Discovery-r17 OPTIONAL,

 supportedBandCombinationListSL-NonRelayDiscovery-v1730 BandCombinationListSL-Discovery-r17 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1740 BandCombinationList-v1740 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1740 BandCombinationList-UplinkTxSwitch-v1740 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v17x0 BandCombinationList-v17x0 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v17x0 BandCombinationList-UplinkTxSwitch-v17x0 OPTIONAL

 ]]

}

RF-Parameters-v15g0 ::= SEQUENCE {

 supportedBandCombinationList-v15g0 BandCombinationList-v15g0 OPTIONAL

}

RF-Parameters-v16a0 ::= SEQUENCE {

 supportedBandCombinationList-v16a0 BandCombinationList-v16a0 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v16a0 BandCombinationList-UplinkTxSwitch-v16a0 OPTIONAL

}

RF-Parameters-v16c0 ::= SEQUENCE {

 supportedBandListNR-v16c0 SEQUENCE (SIZE (1..maxBands)) OF BandNR-v16c0

}

BandNR ::= SEQUENCE {

 bandNR FreqBandIndicatorNR,

 modifiedMPR-Behaviour BIT STRING (SIZE (8)) OPTIONAL,

 mimo-ParametersPerBand MIMO-ParametersPerBand OPTIONAL,

 extendedCP ENUMERATED {supported} OPTIONAL,

 multipleTCI ENUMERATED {supported} OPTIONAL,

 bwp-WithoutRestriction ENUMERATED {supported} OPTIONAL,

 bwp-SameNumerology ENUMERATED {upto2, upto4} OPTIONAL,

 bwp-DiffNumerology ENUMERATED {upto4} OPTIONAL,

 crossCarrierScheduling-SameSCS ENUMERATED {supported} OPTIONAL,

 pdsch-256QAM-FR2 ENUMERATED {supported} OPTIONAL,

 pusch-256QAM ENUMERATED {supported} OPTIONAL,

 ue-PowerClass ENUMERATED {pc1, pc2, pc3, pc4} OPTIONAL,

 rateMatchingLTE-CRS ENUMERATED {supported} OPTIONAL,

 channelBWs-DL CHOICE {

 fr1 SEQUENCE {

 scs-15kHz BIT STRING (SIZE (10)) OPTIONAL,

 scs-30kHz BIT STRING (SIZE (10)) OPTIONAL,

 scs-60kHz BIT STRING (SIZE (10)) OPTIONAL

 },

 fr2 SEQUENCE {

 scs-60kHz BIT STRING (SIZE (3)) OPTIONAL,

 scs-120kHz BIT STRING (SIZE (3)) OPTIONAL

 }

 } OPTIONAL,

 channelBWs-UL CHOICE {

 fr1 SEQUENCE {

 scs-15kHz BIT STRING (SIZE (10)) OPTIONAL,

 scs-30kHz BIT STRING (SIZE (10)) OPTIONAL,

 scs-60kHz BIT STRING (SIZE (10)) OPTIONAL

 },

 fr2 SEQUENCE {

 scs-60kHz BIT STRING (SIZE (3)) OPTIONAL,

 scs-120kHz BIT STRING (SIZE (3)) OPTIONAL

 }

 } OPTIONAL,

 ...,

 [[

 maxUplinkDutyCycle-PC2-FR1 ENUMERATED {n60, n70, n80, n90, n100} OPTIONAL

 ]],

 [[

 pucch-SpatialRelInfoMAC-CE ENUMERATED {supported} OPTIONAL,

 powerBoosting-pi2BPSK ENUMERATED {supported} OPTIONAL

 ]],

 [[

 maxUplinkDutyCycle-FR2 ENUMERATED {n15, n20, n25, n30, n40, n50, n60, n70, n80, n90, n100} OPTIONAL

 ]],

 [[

 channelBWs-DL-v1590 CHOICE {

 fr1 SEQUENCE {

 scs-15kHz BIT STRING (SIZE (16)) OPTIONAL,

 scs-30kHz BIT STRING (SIZE (16)) OPTIONAL,

 scs-60kHz BIT STRING (SIZE (16)) OPTIONAL

 },

 fr2 SEQUENCE {

 scs-60kHz BIT STRING (SIZE (8)) OPTIONAL,

 scs-120kHz BIT STRING (SIZE (8)) OPTIONAL

 }

 } OPTIONAL,

 channelBWs-UL-v1590 CHOICE {

 fr1 SEQUENCE {

 scs-15kHz BIT STRING (SIZE (16)) OPTIONAL,

 scs-30kHz BIT STRING (SIZE (16)) OPTIONAL,

 scs-60kHz BIT STRING (SIZE (16)) OPTIONAL

 },

 fr2 SEQUENCE {

 scs-60kHz BIT STRING (SIZE (8)) OPTIONAL,

 scs-120kHz BIT STRING (SIZE (8)) OPTIONAL

 }

 } OPTIONAL

 ]],

 [[

 asymmetricBandwidthCombinationSet BIT STRING (SIZE (1..32)) OPTIONAL

 ]],

 [[

 -- R1 10: NR-unlicensed

 sharedSpectrumChAccessParamsPerBand-r16 SharedSpectrumChAccessParamsPerBand-r16 OPTIONAL,

 -- R1 11-7b: Independent cancellation of the overlapping PUSCHs in an intra-band UL CA

 cancelOverlappingPUSCH-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 14-1: Multiple LTE-CRS rate matching patterns

 multipleRateMatchingEUTRA-CRS-r16 SEQUENCE {

 maxNumberPatterns-r16 INTEGER (2..6),

 maxNumberNon-OverlapPatterns-r16 INTEGER (1..3)

 } OPTIONAL,

 -- R1 14-1a: Two LTE-CRS overlapping rate matching patterns within a part of NR carrier using 15 kHz overlapping with a LTE carrier

 overlapRateMatchingEUTRA-CRS-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 14-2: PDSCH Type B mapping of length 9 and 10 OFDM symbols

 pdsch-MappingTypeB-Alt-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 14-3: One slot periodic TRS configuration for FR1

 oneSlotPeriodicTRS-r16 ENUMERATED {supported} OPTIONAL,

 olpc-SRS-Pos-r16 OLPC-SRS-Pos-r16 OPTIONAL,

 spatialRelationsSRS-Pos-r16 SpatialRelationsSRS-Pos-r16 OPTIONAL,

 simulSRS-MIMO-TransWithinBand-r16 ENUMERATED {n2} OPTIONAL,

 channelBW-DL-IAB-r16 CHOICE {

 fr1-100mhz SEQUENCE {

 scs-15kHz ENUMERATED {supported} OPTIONAL,

 scs-30kHz ENUMERATED {supported} OPTIONAL,

 scs-60kHz ENUMERATED {supported} OPTIONAL

 },

 fr2-200mhz SEQUENCE {

 scs-60kHz ENUMERATED {supported} OPTIONAL,

 scs-120kHz ENUMERATED {supported} OPTIONAL

 }

 } OPTIONAL,

 channelBW-UL-IAB-r16 CHOICE {

 fr1-100mhz SEQUENCE {

 scs-15kHz ENUMERATED {supported} OPTIONAL,

 scs-30kHz ENUMERATED {supported} OPTIONAL,

 scs-60kHz ENUMERATED {supported} OPTIONAL

 },

 fr2-200mhz SEQUENCE {

 scs-60kHz ENUMERATED {supported} OPTIONAL,

 scs-120kHz ENUMERATED {supported} OPTIONAL

 }

 } OPTIONAL,

 rasterShift7dot5-IAB-r16 ENUMERATED {supported} OPTIONAL,

 ue-PowerClass-v1610 ENUMERATED {pc1dot5} OPTIONAL,

 condHandover-r16 ENUMERATED {supported} OPTIONAL,

 condHandoverFailure-r16 ENUMERATED {supported} OPTIONAL,

 condHandoverTwoTriggerEvents-r16 ENUMERATED {supported} OPTIONAL,

 condPSCellChange-r16 ENUMERATED {supported} OPTIONAL,

 condPSCellChangeTwoTriggerEvents-r16 ENUMERATED {supported} OPTIONAL,

 mpr-PowerBoost-FR2-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 11-9: Multiple active configured grant configurations for a BWP of a serving cell

 activeConfiguredGrant-r16 SEQUENCE {

 maxNumberConfigsPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n12},

 maxNumberConfigsAllCC-r16 INTEGER (2..32)

 } OPTIONAL,

 -- R1 11-9a: Joint release in a DCI for two or more configured grant Type 2 configurations for a given BWP of a serving cell

 jointReleaseConfiguredGrantType2-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 12-2: Multiple SPS configurations

 sps-r16 SEQUENCE {

 maxNumberConfigsPerBWP-r16 INTEGER (1..8),

 maxNumberConfigsAllCC-r16 INTEGER (2..32)

 } OPTIONAL,

 -- R1 12-2a: Joint release in a DCI for two or more SPS configurations for a given BWP of a serving cell

 jointReleaseSPS-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 13-19: Simultaneous positioning SRS and MIMO SRS transmission within a band across multiple CCs

 simulSRS-TransWithinBand-r16 ENUMERATED {n2} OPTIONAL,

 trs-AdditionalBandwidth-r16 ENUMERATED {trs-AddBW-Set1, trs-AddBW-Set2} OPTIONAL,

 handoverIntraF-IAB-r16 ENUMERATED {supported} OPTIONAL

 ]],

 [[

 -- R1 22-5a: Simultaneous transmission of SRS for antenna switching and SRS for CB/NCB /BM for intra-band UL CA

 -- R1 22-5c: Simultaneous transmission of SRS for antenna switching and SRS for antenna switching for intra-band UL CA

 simulTX-SRS-AntSwitchingIntraBandUL-CA-r16 SimulSRS-ForAntennaSwitching-r16 OPTIONAL,

 -- R1 10: NR-unlicensed

 sharedSpectrumChAccessParamsPerBand-v1630 SharedSpectrumChAccessParamsPerBand-v1630 OPTIONAL

 ]],

 [[

 handoverUTRA-FDD-r16 ENUMERATED {supported} OPTIONAL,

 -- R4 7-4: Report the shorter transient capability supported by the UE: 2, 4 or 7us

 enhancedUL-TransientPeriod-r16 ENUMERATED {us2, us4, us7} OPTIONAL,

 sharedSpectrumChAccessParamsPerBand-v1640 SharedSpectrumChAccessParamsPerBand-v1640 OPTIONAL

 ]],

 [[

 type1-PUSCH-RepetitionMultiSlots-v1650 ENUMERATED {supported} OPTIONAL,

 type2-PUSCH-RepetitionMultiSlots-v1650 ENUMERATED {supported} OPTIONAL,

 pusch-RepetitionMultiSlots-v1650 ENUMERATED {supported} OPTIONAL,

 configuredUL-GrantType1-v1650 ENUMERATED {supported} OPTIONAL,

 configuredUL-GrantType2-v1650 ENUMERATED {supported} OPTIONAL,

 sharedSpectrumChAccessParamsPerBand-v1650 SharedSpectrumChAccessParamsPerBand-v1650 OPTIONAL

 ]],

 [[

 enhancedSkipUplinkTxConfigured-v1660 ENUMERATED {supported} OPTIONAL,

 enhancedSkipUplinkTxDynamic-v1660 ENUMERATED {supported} OPTIONAL

 ]],

 [[

 maxUplinkDutyCycle-PC1dot5-MPE-FR1-r16 ENUMERATED {n10, n15, n20, n25, n30, n40, n50, n60, n70, n80, n90, n100} OPTIONAL,

 txDiversity-r16 ENUMERATED {supported} OPTIONAL

 ]],

 [[

 -- R1 36-1: Support of 1024QAM for PDSCH for FR1

 pdsch-1024QAM-FR1-r17 ENUMERATED {supported} OPTIONAL,

 -- R4 22-1 support of FR2 HST operation

 ue-PowerClass-v1700 ENUMERATED {pc5, pc6, pc7} OPTIONAL,

 -- R1 24: NR extension to 71GHz (FR2-2)

 fr2-2-AccessParamsPerBand-r17 FR2-2-AccessParamsPerBand-r17 OPTIONAL,

 rlm-Relaxation-r17 ENUMERATED {supported} OPTIONAL,

 bfd-Relaxation-r17 ENUMERATED {supported} OPTIONAL,

 cg-SDT-r17 ENUMERATED {supported} OPTIONAL,

 locationBasedCondHandover-r17 ENUMERATED {supported} OPTIONAL,

 timeBasedCondHandover-r17 ENUMERATED {supported} OPTIONAL,

 eventA4BasedCondHandover-r17 ENUMERATED {supported} OPTIONAL,

 mn-InitiatedCondPSCellChangeNRDC-r17 ENUMERATED {supported} OPTIONAL,

 sn-InitiatedCondPSCellChangeNRDC-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 29-3a: PDCCH skipping

 pdcch-SkippingWithoutSSSG-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 29-3b: 2 search space sets group switching

 sssg-Switching-1BitInd-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 29-3c: 3 search space sets group switching

 sssg-Switching-2BitInd-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 29-3d: 2 search space sets group switching with PDCCH skipping

 pdcch-SkippingWithSSSG-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 29-3e: Support Search space set group switching capability 2 for FR1

 searchSpaceSetGrp-switchCap2-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 26-1: Uplink Time and Frequency pre-compensation and timing relationship enhancements

 uplinkPreCompensation-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 26-4: UE reporting of information related to TA pre-compensation

 uplink-TA-Reporting-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 26-5: Increasing the number of HARQ processes

 max-HARQ-ProcessNumber-r17 ENUMERATED {u16d32, u32d16, u32d32} OPTIONAL,

 -- R1 26-6: Type-2 HARQ codebook enhancement

 type2-HARQ-Codebook-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 26-6a: Type-1 HARQ codebook enhancement

 type1-HARQ-Codebook-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 26-6b: Type-3 HARQ codebook enhancement

 type3-HARQ-Codebook-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 26-9: UE-specific K\_offset

 ue-specific-K-Offset-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 24-1f: Multiple PDSCH scheduling by single DCI for 120kHz in FR2-1

 multiPDSCH-SingleDCI-FR2-1-SCS-120kHz-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 24-1g: Multiple PUSCH scheduling by single DCI for 120kHz in FR2-1

 multiPUSCH-SingleDCI-FR2-1-SCS-120kHz-r17 ENUMERATED {supported} OPTIONAL,

 -- R4 14-4: Parallel PRS measurements in RRC\_INACTIVE state, FR1/FR2 diff

 parallelPRS-MeasRRC-Inactive-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 27-1-2: Support of UE-TxTEGs for UL TDOA

 nr-UE-TxTEG-ID-MaxSupport-r17 ENUMERATED {n1, n2, n3, n4, n6, n8} OPTIONAL,

 -- R1 27-17: PRS processing in RRC\_INACTIVE

 prs-ProcessingRRC-Inactive-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 27-3-2: DL PRS measurement outside MG and in a PRS processing window

 prs-ProcessingWindowType1A-r17 ENUMERATED {option1, option2, option3} OPTIONAL,

 prs-ProcessingWindowType1B-r17 ENUMERATED {option1, option2, option3} OPTIONAL,

 prs-ProcessingWindowType2-r17 ENUMERATED {option1, option2, option3} OPTIONAL,

 -- R1 27-15: Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP

 srs-AllPosResourcesRRC-Inactive-r17 SRS-AllPosResourcesRRC-Inactive-r17 OPTIONAL,

 -- R1 27-16: OLPC for positioning SRS in RRC\_INACTIVE state - gNB

 olpc-SRS-PosRRC-Inactive-r17 OLPC-SRS-Pos-r16 OPTIONAL,

 -- R1 27-19: Spatial relation for positioning SRS in RRC\_INACTIVE state - gNB

 spatialRelationsSRS-PosRRC-Inactive-r17 SpatialRelationsSRS-Pos-r16 OPTIONAL,

 -- R1 30-1: Increased maximum number of PUSCH Type A repetitions

 maxNumberPUSCH-TypeA-Repetition-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-2: PUSCH Type A repetitions based on available slots

 puschTypeA-RepetitionsAvailSlot-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-3: TB processing over multi-slot PUSCH

 tb-ProcessingMultiSlotPUSCH-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-3a: Repetition of TB processing over multi-slot PUSCH

 tb-ProcessingRepMultiSlotPUSCH-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4: The maximum duration for DM-RS bundling

 maxDurationDMRS-Bundling-r17 SEQUENCE {

 fdd-r17 ENUMERATED {n4, n8, n16, n32} OPTIONAL,

 tdd-r17 ENUMERATED {n2, n4, n8, n16} OPTIONAL

 } OPTIONAL,

 -- R1 30-6: Repetition of PUSCH transmission scheduled by RAR UL grant and DCI format 0\_0 with CRC scrambled by TC-RNTI

 pusch-RepetitionMsg3-r17 ENUMERATED {supported} OPTIONAL,

 sharedSpectrumChAccessParamsPerBand-v1710 SharedSpectrumChAccessParamsPerBand-v1710 OPTIONAL,

 -- R4 25-2: Parallel measurements on cells belonging to a different NGSO satellite than a serving satellite without scheduling restrictions

 -- on normal operations with the serving cell

 parallelMeasurementWithoutRestriction-r17 ENUMERATED {supported} OPTIONAL,

 -- R4 25-5: Parallel measurements on multiple NGSO satellites within a SMTC

 maxNumber-NGSO-SatellitesWithinOneSMTC-r17 ENUMERATED {n1, n2, n3, n4} OPTIONAL,

 -- R1 26-10: K1 range extension

 k1-RangeExtension-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 35-1: Aperiodic CSI-RS for tracking for fast SCell activation

 aperiodicCSI-RS-FastScellActivation-r17 SEQUENCE {

 maxNumberAperiodicCSI-RS-PerCC-r17 ENUMERATED {n8, n16, n32, n48, n64, n128, n255},

 maxNumberAperiodicCSI-RS-AcrossCCs-r17 ENUMERATED {n8, n16, n32, n64, n128, n256, n512, n1024}

 } OPTIONAL,

 -- R1 35-2: Aperiodic CSI-RS bandwidth for tracking for fast SCell activation for 10MHz UE channel bandwidth

 aperiodicCSI-RS-AdditionalBandwidth-r17 ENUMERATED {addBW-Set1, addBW-Set2} OPTIONAL,

 -- R1 28-1a: RRC-configured DL BWP without CD-SSB or NCD-SSB

 bwp-WithoutCD-SSB-OrNCD-SSB-RedCap-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 28-3: Half-duplex FDD operation type A for RedCap UE

 halfDuplexFDD-TypeA-RedCap-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 27-15b: Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP

 posSRS-RRC-Inactive-OutsideInitialUL-BWP-r17 PosSRS-RRC-Inactive-OutsideInitialUL-BWP-r17 OPTIONAL,

 -- R4 15-3 UE support of CBW for 480kHz SCS

 channelBWs-DL-SCS-480kHz-FR2-2-r17 BIT STRING (SIZE (8)) OPTIONAL,

 channelBWs-UL-SCS-480kHz-FR2-2-r17 BIT STRING (SIZE (8)) OPTIONAL,

 -- R4 15-4 UE support of CBW for 960kHz SCS

 channelBWs-DL-SCS-960kHz-FR2-2-r17 BIT STRING (SIZE (8)) OPTIONAL,

 channelBWs-UL-SCS-960kHz-FR2-2-r17 BIT STRING (SIZE (8)) OPTIONAL,

 -- R4 17-1 UL gap for Tx power management

 ul-GapFR2-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 25-4: One-shot HARQ ACK feedback triggered by DCI format 1\_2

 oneShotHARQ-feedbackTriggeredByDCI-1-2-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 25-5: PHY priority handling for one-shot HARQ ACK feedback

 oneShotHARQ-feedbackPhy-Priority-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 25-6: Enhanced type 3 HARQ-ACK codebook feedback

 enhancedType3-HARQ-CodebookFeedback-r17 SEQUENCE {

 enhancedType3-HARQ-Codebooks-r17 ENUMERATED {n1, n2, n4, n8},

 maxNumberPUCCH-Transmissions-r17 ENUMERATED {n1, n2, n3, n4, n5, n6, n7}

 } OPTIONAL,

 -- R1 25-7: Triggered HARQ-ACK codebook re-transmission

 triggeredHARQ-CodebookRetx-r17 SEQUENCE {

 minHARQ-Retx-Offset-r17 ENUMERATED {n-7, n-5, n-3, n-1, n1},

 maxHARQ-Retx-Offset-r17 ENUMERATED {n4, n6, n8, n10, n12, n14, n16, n18, n20, n22, n24}

 } OPTIONAL

 ]],

 [[

 -- R4 22-2 support of one shot large UL timing adjustment

 ue-OneShotUL-TimingAdj-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 25-2: Repetitions for PUCCH format 0, and 2 over multiple slots with K = 2, 4, 8

 pucch-Repetition-F0-2-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 25-11a: 4-bits subband CQI for NTN and unlicensed

 cqi-4-BitsSubbandNTN-SharedSpectrumChAccess-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 25-16: HARQ-ACK with different priorities multiplexing on a PUCCH/PUSCH

 mux-HARQ-ACK-DiffPriorities-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 25-20a: Propagation delay compensation based on legacy TA procedure for NTN and unlicensed

 ta-BasedPDC-NTN-SharedSpectrumChAccess-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-2b: DCI-based enabling/disabling ACK/NACK-based feedback for dynamic scheduling for multicast

 ack-NACK-FeedbackForMulticastWithDCI-Enabler-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-2e: Multiple G-RNTIs for group-common PDSCHs

 maxNumberG-RNTI-r17 INTEGER (2..8) OPTIONAL,

 -- R1 33-2f: Dynamic multicast with DCI format 4\_2

 dynamicMulticastDCI-Format4-2-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-2i: Supported maximal modulation order for multicast PDSCH

 maxModulationOrderForMulticast-r17 CHOICE {

 fr1-r17 ENUMERATED {qam256, qam1024},

 fr2-r17 ENUMERATED {qam64, qam256}

 } OPTIONAL,

 -- R1 33-3-1: Dynamic Slot-level repetition for group-common PDSCH for TN and licensed

 dynamicSlotRepetitionMulticastTN-NonSharedSpectrumChAccess-r17 ENUMERATED {n8, n16} OPTIONAL,

 -- R1 33-3-1a: Dynamic Slot-level repetition for group-common PDSCH for NTN and unlicensed

 dynamicSlotRepetitionMulticastNTN-SharedSpectrumChAccess-r17 ENUMERATED {n8, n16} OPTIONAL,

 -- R1 33-4-1: DCI-based enabling/disabling NACK-only based feedback for dynamic scheduling for multicast

 nack-OnlyFeedbackForMulticastWithDCI-Enabler-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-5-1b: DCI-based enabling/disabling ACK/NACK-based feedback for dynamic scheduling for multicast

 ack-NACK-FeedbackForSPS-MulticastWithDCI-Enabler-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-5-1h: Multiple G-CS-RNTIs for SPS group-common PDSCHs

 maxNumberG-CS-RNTI-r17 INTEGER (2..8) OPTIONAL,

 -- R1 33-10: Support group-common PDSCH RE-level rate matching for multicast

 re-LevelRateMatchingForMulticast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 36-1a: Support of 1024QAM for PDSCH with maximum 2 MIMO layers for FR1

 pdsch-1024QAM-2MIMO-FR1-r17 ENUMERATED {supported} OPTIONAL,

 -- R4 14-3 PRS measurement without MG

 prs-MeasurementWithoutMG-r17 ENUMERATED {cpLength, quarterSymbol, halfSymbol, halfSlot} OPTIONAL,

 -- R4 25-7: The number of target LEO satellites the UE can monitor per carrier

 maxNumber-LEO-SatellitesPerCarrier-r17 INTEGER (3..4) OPTIONAL,

 -- R1 27-3-3 DL PRS Processing Capability outside MG - buffering capability

 prs-ProcessingCapabilityOutsideMGinPPW-r17 SEQUENCE (SIZE(1..3)) OF PRS-ProcessingCapabilityOutsideMGinPPWperType-r17 OPTIONAL,

 -- R1 27-15a: Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP with semi-persistent SRS

 srs-SemiPersistent-PosResourcesRRC-Inactive-r17 SEQUENCE {

 maxNumOfSemiPersistentSRSposResources-r17 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},

 maxNumOfSemiPersistentSRSposResourcesPerSlot-r17 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}

 } OPTIONAL,

 -- R2: UE support of CBW for 120kHz SCS

 channelBWs-DL-SCS-120kHz-FR2-2-r17 BIT STRING (SIZE (8)) OPTIONAL,

 channelBWs-UL-SCS-120kHz-FR2-2-r17 BIT STRING (SIZE (8)) OPTIONAL

 ]],

 [[

 -- R1 30-4a: DM-RS bundling for PUSCH repetition type A

 dmrs-BundlingPUSCH-RepTypeA-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4b: DM-RS bundling for PUSCH repetition type B

 dmrs-BundlingPUSCH-RepTypeB-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4c: DM-RS bundling for TB processing over multi-slot PUSCH

 dmrs-BundlingPUSCH-multiSlot-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4d: DMRS bundling for PUCCH repetitions

 dmrs-BundlingPUCCH-Rep-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4e: Enhanced inter-slot frequency hopping with inter-slot bundling for PUSCH

 interSlotFreqHopInterSlotBundlingPUSCH-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4f: Enhanced inter-slot frequency hopping for PUCCH repetitions with DMRS bundling

 interSlotFreqHopPUCCH-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4g: Restart DM-RS bundling

 dmrs-BundlingRestart-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 30-4h: DM-RS bundling for non-back-to-back transmission

 dmrs-BundlingNonBackToBackTX-r17 ENUMERATED {supported} OPTIONAL

 ]],

 [[

 -- R1 33-5-1e: Dynamic Slot-level repetition for SPS group-common PDSCH for multicast

 maxDynamicSlotRepetitionForSPS-Multicast-r17 ENUMERATED {n8, n16} OPTIONAL,

 -- R1 33-5-1g: DCI-based enabling/disabling NACK-only based feedback for SPS group-common PDSCH for multicast

 nack-OnlyFeedbackForSPS-MulticastWithDCI-Enabler-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-5-1i: Multicast SPS scheduling with DCI format 4\_2

 sps-MulticastDCI-Format4-2-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-5-2: Multiple SPS group-common PDSCH configuration on PCell

 sps-MulticastMultiConfig-r17 INTEGER (1..8) OPTIONAL,

 -- R1 33-6-1: DL priority indication for multicast in DCI

 priorityIndicatorInDCI-Multicast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-6-1a: DL priority configuration for SPS multicast

 priorityIndicatorInDCI-SPS-Multicast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-6-2: Two HARQ-ACK codebooks simultaneously constructed for supporting HARQ-ACK codebooks with different priorities

 -- for unicast and multicast at a UE

 twoHARQ-ACK-CodebookForUnicastAndMulticast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-6-3: More than one PUCCH for HARQ-ACK transmission for multicast or for unicast and multicast within a slot

 multiPUCCH-HARQ-ACK-ForMulticastUnicast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-9: Supporting unicast PDCCH to release SPS group-common PDSCH

 releaseSPS-MulticastWithCS-RNTI-r17 ENUMERATED {supported} OPTIONAL

 ]]

}

BandNR-v16c0 ::= SEQUENCE {

 pusch-RepetitionTypeA-v16c0 ENUMERATED {supported} OPTIONAL,

 ...

}

-- TAG-RF-PARAMETERS-STOP

-- ASN1STOP

|  |
| --- |
| ***RF-Parameters* field descriptions** |
| ***appliedFreqBandListFilter***In this field the UE mirrors the *FreqBandList* that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the *supportedBandCombinationList* in accordance with this *appliedFreqBandListFilter*. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10]. |
| ***supportedBandCombinationList***A list of band combinations that the UE supports for NR (and NR-DC, if requested). The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-NR-Capability* IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10]. |
| ***supportedBandCombinationListSidelinkEUTRA-NR***A list of band combinations that the UE supports for NR sidelink communication only, for joint NR sidelink communication and V2X sidelink communication, or for V2X sidelink communication only. The UE does not include this field if the UE capability is requested by E-UTRAN (see TS 36.331[10]) and the network request includes the field *eutra-nr-only*. |
| ***supportedBandCombinationListSL-NonRelayDiscovery***A list of band combinations that the UE supports for NR sidelink non-relay discovery. The encoding is defined in PC5 *BandCombinationListSidelinkNR-r16.* |
| ***supportedBandCombinationListSL-RelayDiscovery***A list of band combinations that the UE supports for NR sidelink relay discovery. The encoding is defined in PC5 *BandCombinationListSidelinkNR-r16.* |
| ***supportedBandCombinationList-UplinkTxSwitch***A list of band combinations that the UE supports dynamic uplink Tx switching for NR UL CA and SUL. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-NR-Capability* IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10]. |
| ***supportedBandListNR***A list of NR bands supported by the UE. If *supportedBandListNR-v16c0* is included, the UE shall include the same number of entries, and listed in the same order, as in *supportedBandListNR* (without suffix). |

– *RF-ParametersMRDC*

The IE *RF-ParametersMRDC* is used to convey RF related capabilities for MR-DC.

***RF-ParametersMRDC* information element**

-- ASN1START

-- TAG-RF-PARAMETERSMRDC-START

RF-ParametersMRDC ::= SEQUENCE {

 supportedBandCombinationList BandCombinationList OPTIONAL,

 appliedFreqBandListFilter FreqBandList OPTIONAL,

 ...,

 [[

 srs-SwitchingTimeRequested ENUMERATED {true} OPTIONAL,

 supportedBandCombinationList-v1540 BandCombinationList-v1540 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1550 BandCombinationList-v1550 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1560 BandCombinationList-v1560 OPTIONAL,

 supportedBandCombinationListNEDC-Only BandCombinationList OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1570 BandCombinationList-v1570 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1580 BandCombinationList-v1580 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1590 BandCombinationList-v1590 OPTIONAL

 ]],

 [[

 supportedBandCombinationListNEDC-Only-v15a0 SEQUENCE {

 supportedBandCombinationList-v1540 BandCombinationList-v1540 OPTIONAL,

 supportedBandCombinationList-v1560 BandCombinationList-v1560 OPTIONAL,

 supportedBandCombinationList-v1570 BandCombinationList-v1570 OPTIONAL,

 supportedBandCombinationList-v1580 BandCombinationList-v1580 OPTIONAL,

 supportedBandCombinationList-v1590 BandCombinationList-v1590 OPTIONAL

 } OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1610 BandCombinationList-v1610 OPTIONAL,

 supportedBandCombinationListNEDC-Only-v1610 BandCombinationList-v1610 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-r16 BandCombinationList-UplinkTxSwitch-r16 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1630 BandCombinationList-v1630 OPTIONAL,

 supportedBandCombinationListNEDC-Only-v1630 BandCombinationList-v1630 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1630 BandCombinationList-UplinkTxSwitch-v1630 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1640 BandCombinationList-v1640 OPTIONAL,

 supportedBandCombinationListNEDC-Only-v1640 BandCombinationList-v1640 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1640 BandCombinationList-UplinkTxSwitch-v1640 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-UplinkTxSwitch-v1670 BandCombinationList-UplinkTxSwitch-v1670 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1700 BandCombinationList-v1700 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1700 BandCombinationList-UplinkTxSwitch-v1700 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1720 BandCombinationList-v1720 OPTIONAL,

 supportedBandCombinationListNEDC-Only-v1720 SEQUENCE {

 supportedBandCombinationList-v1700 BandCombinationList-v1700 OPTIONAL,

 supportedBandCombinationList-v1720 BandCombinationList-v1720 OPTIONAL

 } OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1720 BandCombinationList-UplinkTxSwitch-v1720 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1730 BandCombinationList-v1730 OPTIONAL,

 supportedBandCombinationListNEDC-Only-v1730 BandCombinationList-v1730 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1730 BandCombinationList-UplinkTxSwitch-v1730 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v1740 BandCombinationList-v1740 OPTIONAL,

 supportedBandCombinationListNEDC-Only-v1740 BandCombinationList-v1740 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v1740 BandCombinationList-UplinkTxSwitch-v1740 OPTIONAL

 ]],

 [[

 supportedBandCombinationList-v17x0 BandCombinationList-v17x0 OPTIONAL,

 supportedBandCombinationListNEDC-Only-v17x0 BandCombinationList-v17x0 OPTIONAL,

 supportedBandCombinationList-UplinkTxSwitch-v17x0 BandCombinationList-UplinkTxSwitch-v17x0 OPTIONAL

 ]]

}

RF-ParametersMRDC-v15g0 ::= SEQUENCE {

 supportedBandCombinationList-v15g0 BandCombinationList-v15g0 OPTIONAL,

 supportedBandCombinationListNEDC-Only-v15g0 BandCombinationList-v15g0 OPTIONAL

}

-- TAG-RF-PARAMETERSMRDC-STOP

-- ASN1STOP

|  |
| --- |
| ***RF-ParametersMRDC* field descriptions** |
| ***appliedFreqBandListFilter***In this field the UE mirrors the *FreqBandList* that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the *supportedBandCombinationList* in accordance with this *appliedFreqBandListFilter*. |
| ***supportedBandCombinationList***A list of band combinations that the UE supports for (NG)EN-DC, or both (NG)EN-DC and NE-DC. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-MRDC-Capability* IE. |
| ***supportedBandCombinationListNEDC-Only, supportedBandCombinationListNEDC-Only-v1610, supportedBandCombinationListNEDC-Only-v17x0***A list of band combinations that the UE supports only for NE-DC. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-MRDC-Capability* IE. |
| ***supportedBandCombinationList-UplinkTxSwitch***A list of band combinations that the UE supports dynamic UL Tx switching for (NG)EN-DC. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-MRDC-Capability* IE. |

– *SupportedAggBandwidth*

The IE *SupportedAggBandwidth* is used to indicate the aggregated bandwidth supported by the UE.

***SupportedAggBandwidth* information element**

-- ASN1START

-- TAG-SUPPORTEDAGGBANDWIDTH-START

SupportedAggBandwidth-r17 ::= ENUMERATED {FFS: May need CHOICE structure allowing different value sets for FR1, FR2 and so on}

-- TAG-SUPPORTEDAGGBANDWIDTH-STOP

-- ASN1STOP

– *FeatureSetDownlinkPerCC*

The IE *FeatureSetDownlinkPerCC* indicates a set of features that the UE supports on the corresponding carrier of one band entry of a band combination.

***FeatureSetDownlinkPerCC* information element**

-- ASN1START

-- TAG-FEATURESETDOWNLINKPERCC-START

FeatureSetDownlinkPerCC ::= SEQUENCE {

 supportedSubcarrierSpacingDL SubcarrierSpacing,

 supportedBandwidthDL SupportedBandwidth,

 channelBW-90mhz ENUMERATED {supported} OPTIONAL,

 maxNumberMIMO-LayersPDSCH MIMO-LayersDL OPTIONAL,

 supportedModulationOrderDL ModulationOrder OPTIONAL

}

FeatureSetDownlinkPerCC-v1620 ::= SEQUENCE {

 -- R1 16-2a: Mulit-DCI based multi-TRP

 multiDCI-MultiTRP-r16 MultiDCI-MultiTRP-r16 OPTIONAL,

 -- R1 16-2b-3: Support of single-DCI based FDMSchemeB

 supportFDM-SchemeB-r16 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlinkPerCC-v1700 ::= SEQUENCE {

 supportedMinBandwidthDL-r17 SupportedBandwidth-v1700 OPTIONAL,

 broadcastSCell-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-2g: MIMO layers for multicast PDSCH

 maxNumberMIMO-LayersMulticastPDSCH-r17 ENUMERATED {n2, n4, n8} OPTIONAL,

 -- R1 33-2h: Dynamic scheduling for multicast for SCell

 dynamicMulticastSCell-r17 ENUMERATED {supported} OPTIONAL,

 supportedBandwidthDL-v1710 SupportedBandwidth-v1700 OPTIONAL,

 -- R4 24-1/24-2/24-3/24-4/24-5

 supportedCRS-InterfMitigation-r17 CRS-InterfMitigation-r17 OPTIONAL

}

FeatureSetDownlinkPerCC-v1720 ::= SEQUENCE {

 -- R1 33-2j: Supported maximum modulation order used for maximum data rate calculation for multicast PDSCH

 maxModulationOrderForMulticastDataRateCalculation-r17 ENUMERATED {qam64, qam256, qam1024} OPTIONAL,

 -- R1 33-1-2: FDM-ed unicast PDSCH and group-common PDSCH for broadcast

 fdm-BroadcastUnicast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-3-2: FDM-ed unicast PDSCH and one group-common PDSCH for multicast

 fdm-MulticastUnicast-r17 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlinkPerCC-v1730 ::= SEQUENCE {

 -- R1 33-3-3: Intra-slot TDM-ed unicast PDSCH and group-common PDSCH

 intraSlotTDM-UnicastGroupCommonPDSCH-r17 ENUMERATED {yes, no} OPTIONAL,

 -- R1 33-5-3: One SPS group-common PDSCH configuration for multicast for SCell

 sps-MulticastSCell-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-5-4: Up to 8 SPS group-common PDSCH configurations per CFR for multicast for SCell

 sps-MulticastSCellMultiConfig-r17 INTEGER (1..8) OPTIONAL,

 -- R1 33-1-1: Dynamic slot-level repetition for broadcast MTCH

 dci-BroadcastWith16Repetitions-r17 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlinkPerCC-v17x0 ::= SEQUENCE {

 -- Intended for intra-band FR1 CA only

 supportedBandwidthDL-r17 SupportedBandwidth OPTIONAL,

 maxNumberMIMO-LayersPDSCH-r17 MIMO-LayersDL OPTIONAL

}

MultiDCI-MultiTRP-r16 ::= SEQUENCE {

 maxNumberCORESET-r16 ENUMERATED {n2, n3, n4, n5},

 maxNumberCORESETPerPoolIndex-r16 INTEGER (1..3),

 maxNumberUnicastPDSCH-PerPool-r16 ENUMERATED {n1, n2, n3, n4, n7}

}

CRS-InterfMitigation-r17 ::= SEQUENCE {

 -- R4 24-1 CRS-IM (Interference Mitigation) in DSS scenario

 crs-IM-DSS-15kHzSCS-r17 ENUMERATED {supported} OPTIONAL,

 -- R4 24-2 CRS-IM in non-DSS and 15 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth

 crs-IM-nonDSS-15kHzSCS-r17 ENUMERATED {supported} OPTIONAL,

 -- R4 24-3 CRS-IM in non-DSS and 15 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth

 crs-IM-nonDSS-NWA-15kHzSCS-r17 ENUMERATED {supported} OPTIONAL,

 -- R4 24-4 CRS-IM in non-DSS and 30 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth

 crs-IM-nonDSS-30kHzSCS-r17 ENUMERATED {supported} OPTIONAL,

 -- R4 24-5 CRS-IM in non-DSS and 30 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth

 crs-IM-nonDSS-NWA-30kHzSCS-r17 ENUMERATED {supported} OPTIONAL

}

-- TAG-FEATURESETDOWNLINKPERCC-STOP

-- ASN1STOP

[…]

– *FeatureSets*

The IE *FeatureSets* is used to provide pools of downlink and uplink features sets. A *FeatureSetCombination* refers to the IDs of the feature set(s) that the UE supports in that *FeatureSetCombination*. The *BandCombination* entries in the *BandCombinationList* then indicate the ID of the *FeatureSetCombination* that the UE supports for that band combination.

The entries in the lists in this IE are identified by their index position. For example, the *FeatureSetUplinkPerCC-Id* = 4 identifies the 4th element in the *featureSetsUplinkPerCC* list.

NOTE: When feature sets (per CC) IEs require extension in future versions of the specification, new versions of the *FeatureSetDownlink*, *FeatureSetUplink*, *FeatureSets*, *FeatureSetDownlinkPerCC* and/or *FeatureSetUplinkPerCC* will be created and instantiated in corresponding new lists in the *FeatureSets* IE. For example, if new capability bits are to be added to the *FeatureSetDownlink*, they will instead be defined in a new *FeatureSetDownlink-rxy* which will be instantiated in a new *featureSetDownlinkList-rxy* list. If a UE indicates in a *FeatureSetCombination* that it supports the *FeatureSetDownlink* with ID #5, it implies that it supports both the features in *FeatureSetDownlink* #5 and *FeatureSetDownlink-rxy* #5 (if present). The number of entries in the new list(s) shall be the same as in the original list(s).

***FeatureSets* information element**

-- ASN1START

-- TAG-FEATURESETS-START

FeatureSets ::= SEQUENCE {

 featureSetsDownlink SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink OPTIONAL,

 featureSetsDownlinkPerCC SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC OPTIONAL,

 featureSetsUplink SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink OPTIONAL,

 featureSetsUplinkPerCC SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC OPTIONAL,

 ...,

 [[

 featureSetsDownlink-v1540 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1540 OPTIONAL,

 featureSetsUplink-v1540 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1540 OPTIONAL,

 featureSetsUplinkPerCC-v1540 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1540 OPTIONAL

 ]],

 [[

 featureSetsDownlink-v15a0 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v15a0 OPTIONAL

 ]],

 [[

 featureSetsDownlink-v1610 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1610 OPTIONAL,

 featureSetsUplink-v1610 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1610 OPTIONAL,

 featureSetDownlinkPerCC-v1620 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1620 OPTIONAL

 ]],

 [[

 featureSetsUplink-v1630 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1630 OPTIONAL

 ]],

 [[

 featureSetsUplink-v1640 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1640 OPTIONAL

 ]],

 [[

 featureSetsDownlink-v1700 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1700 OPTIONAL,

 featureSetsDownlinkPerCC-v1700 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1700 OPTIONAL,

 featureSetsUplink-v1710 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1710 OPTIONAL,

 featureSetsUplinkPerCC-v1700 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1700 OPTIONAL

 ]],

 [[

 featureSetsDownlink-v1720 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1720 OPTIONAL,

 featureSetsDownlinkPerCC-v1720 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1720 OPTIONAL,

 featureSetsUplink-v1720 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1720 OPTIONAL

 ]],

 [[

 featureSetsDownlink-v1730 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1730 OPTIONAL,

 featureSetsDownlinkPerCC-v1730 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1730 OPTIONAL

 ]],

 featureSetsDownlinkPerCC-v17x0 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v17x0 OPTIONAL,

 featureSetsUplinkPerCC-v17x0 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v17x0 OPTIONAL

}

FeatureSets-v16d0 ::= SEQUENCE {

 featureSetsUplink-v16d0 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v16d0 OPTIONAL

}

-- TAG-FEATURESETS-STOP

-- ASN1STOP

[…]

– *FeatureSetUplinkPerCC*

The IE *FeatureSetUplinkPerCC* indicates a set of features that the UE supports on the corresponding carrier of one band entry of a band combination.

***FeatureSetUplinkPerCC* information element**

-- ASN1START

-- TAG-FEATURESETUPLINKPERCC-START

FeatureSetUplinkPerCC ::= SEQUENCE {

 supportedSubcarrierSpacingUL SubcarrierSpacing,

 supportedBandwidthUL SupportedBandwidth,

 channelBW-90mhz ENUMERATED {supported} OPTIONAL,

 mimo-CB-PUSCH SEQUENCE {

 maxNumberMIMO-LayersCB-PUSCH MIMO-LayersUL OPTIONAL,

 maxNumberSRS-ResourcePerSet INTEGER (1..2)

 } OPTIONAL,

 maxNumberMIMO-LayersNonCB-PUSCH MIMO-LayersUL OPTIONAL,

 supportedModulationOrderUL ModulationOrder OPTIONAL

}

FeatureSetUplinkPerCC-v1540 ::= SEQUENCE {

 mimo-NonCB-PUSCH SEQUENCE {

 maxNumberSRS-ResourcePerSet INTEGER (1..4),

 maxNumberSimultaneousSRS-ResourceTx INTEGER (1..4)

 } OPTIONAL

}

FeatureSetUplinkPerCC-v1700 ::= SEQUENCE {

 supportedMinBandwidthUL-r17 SupportedBandwidth-v1700 OPTIONAL,

 -- R1 23-3-1-3 FeMIMO: Multi-TRP PUSCH repetition (type B) - non-codebook based

 mTRP-PUSCH-RepetitionTypeB-r17 ENUMERATED {n1,n2,n3,n4} OPTIONAL,

 -- R1 23-3-1-1 -codebook based Multi-TRP PUSCH repetition (type B)

 mTRP-PUSCH-TypeB-CB-r17 ENUMERATED {n1,n2,n4} OPTIONAL,

 supportedBandwidthUL-v1710 SupportedBandwidth-v1700 OPTIONAL

}

FeatureSetUplinkPerCC-v17x0 ::= SEQUENCE {

 -- Intended for intra-band FR1 CA only

 supportedBandwidthUL-r17 SupportedBandwidth OPTIONAL,

 maxNumberMIMO-LayersCB-PUSCH-r17 MIMO-LayersUL OPTIONAL,

 maxNumberMIMO-LayersNonCB-PUSCH-r17 MIMO-LayersUL OPTIONAL

}

-- TAG-FEATURESETUPLINKPERCC-STOP

-- ASN1STOP

– *MIMO-Layers*

The IE *MIMO-Layers* is used to convey the number of supported MIMO layers.

***MIMO-Layers* information element**

-- ASN1START

-- TAG-MIMO-LAYERS-START

MIMO-LayersDL ::= ENUMERATED {twoLayers, fourLayers, eightLayers}

MIMO-LayersUL ::= ENUMERATED {oneLayer, twoLayers, fourLayers}

MIMO-LayersDL-r17 ::= ENUMERATED {FFS}

MIMO-LayersUL-r17 ::= ENUMERATED {FFS}

-- TAG-MIMO-LAYERS-STOP

-- ASN1STOP